

The
SHIPBUILDER
VOL. 5.



James Bond

THE SHIPBUILDER.

A Quarterly Magazine devoted to
The Shipbuilding, Marine Engineering and Allied Industries.

Edited by A. G. HOOD.

VOLUME V.

1910—1911.

NEWCASTLE-ON-TYNE AND LONDON:

Published by *The Shipbuilder* Press, Newcastle-on-Tyne, and the Gilbert-Wood Press,
Norfolk House, Victoria Embankment, W.C.

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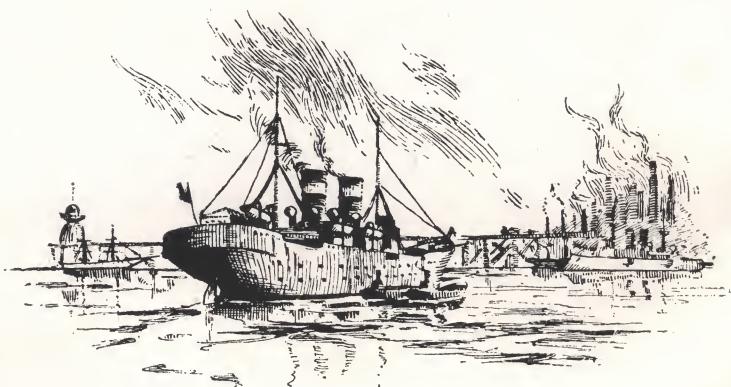




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THE RIGHT HON. LORD FURNESS.

THE SHIPBUILDER.

A Quarterly Magazine devoted to
The Shipbuilding, Marine Engineering and Allied Industries.

Edited by A. G. HOOD.

VOL. V.

SUMMER NUMBER, 1910.

No. 17.

A Comparative Survey of Battleship Design.*

THE WORLD'S SUPER-“DREADNOUGHTS.”

THE fact that we are able, within four-and-a-half years from the launch of the *Dreadnought*, to tabulate a list of some eighty odd British and foreign battleships of the “Mastodon” type, inclusive of mixed calibre ships such as the French *Dantons* and the British *Lord Nelsons*, is a striking testimony to the intense naval activity which has resulted from the introduction of the all-big-gun ship by our Admiralty. The brief halt that was called in foreign dockyards until plans for vessels to equal or excel the British Leviathan had been drawn out, has been followed by a worldwide production of monster battleships of many and varied types, each nation claiming to have solved the problem of the particular design most suitable for their national requirements *pro tem.*

That the actual design of the *Dreadnought* was not copied abroad is not greatly to be wondered at, considering that her disposition of guns has already been abandoned in our latest ships for one allowing a greater concentration of broadside fire. It is, however, in the question as to what is really the best arrangement for the heavy artillery that the great difference of opinion lies. For the time being the calibre of big guns is limited to 12 inches, and the concentration of the maximum power in the individual ship—*vice* the construction of a larger number of less formidable units—has made the question an acute one. It is an axiom in our own fleet that more than ten guns on the broadside cannot be adequately “controlled,” and that twelve guns is the maximum number that can be carried

without undue interference. Hence the only solution to the problem of improving the present best design is to increase the calibre of the guns from 12in. to 13·5, 14 or 16·5in., and perhaps even more.

A design carrying ten 13·5-in. guns has been on the *tapis* for a long time; but owing to a natural reluctance to introduce another type of ship which would make *Dreadnoughts* more or less obsolete, there has been a pronounced policy of marking time in favour of the 12-in. both at Whitehall and abroad. The dawn of a new era in gun dimensions is, however, already in sight. The United States 27,000-ton class are to have 14-in. guns, and it is practically certain that either 13·5 or 14·2-in. pieces will be carried in our own battleships of the 1911–12 programme, if not in some of those already under construction.

The discussion as to the relative merits of the 12-in. and bigger weapons is beyond the scope of the present article, and we must confine ourselves to a consideration of the various ways of placing 12-in. guns so as to secure the greatest all-round bearing, as exemplified in warships under consideration. For this reason we have selected the latest production of each of the Powers of which details have been authenticated, in such a way as to illustrate the seven main dispositions of armament. That most are to some degree finer fighting machines—at least on paper—than their British prototype is evident, and for this reason the term “Super-*Dreadnought*”

* Other articles in this series appeared in No. 12, Vol. III., and No. 14, Vol. IV.

is no misnomer. Properly speaking, all battleships carrying more than ten big guns, or mounting more than eight that can bear on either beam, should be put in this category, leaving a third classification of semi-*Dreadnoughts* for such types as the Spanish *España*, the United States *Michigan* and the like, which have only eight big guns.

Now the number of ways in which ten or twelve big guns may be disposed upon a ship is, theoretically, almost unlimited, but of these the main proportion may be dismissed as impracticable or absurd, the field being narrowed down to various permutations of four distinct methods of disposition, *viz.*, (a) two centre-line plus four or more wing turrets, as exemplified in the *Nassau* and *Settsu*, (b) all turrets in centre-line on the same level as in the *Poltava*, or (c) on different levels as in the *Florida*, and (d) centre-line plus wing or diagonally placed turrets as in the *Dreadnought*, *Moreno*, and *Courbet*. A fifth class might be included for triple-gun turrets, but as these fitments could appear in any of the dispositions under consideration the distinction is unnecessary so far as the present article is concerned.

It will be remembered that in our first seven *Dreadnoughts* the guns were disposed in three centre-line and two wing double turrets, allowing an axial fire of six guns ahead or astern and eight guns on either beam. The design was the result of the most careful consideration, and permitted of 60 and 80 per cent of the armament being used on the axial line or broadside respectively. At the time, it must be remembered that super-firing guns were regarded as dangerous and liable to cause interference from blast effects, owing to the results of experiments carried out on the French *Henri IV*. many years ago, when the turrets were wrongly spaced and thinly protected, and also to the natural inference of the results which, it seemed, must ensue from such proximity of fire. For these and other reasons, the obvious improvement in the *Dreadnought* design of raising the centre-line turret to fire over the aftermost was delayed until the *Neptune* was built and the results of exhaustive experiments both at home and abroad had shown that guns could be so mounted, under proper conditions, without injurious effects to the gun numbers in the turret below.

The second controversial point in gun disposition has been the diagonal placing of turrets so that cross-deck fire could be made use of. In early days *en echelon* barbettes were mounted in the *Italia*, *Lepanto*, *Riachuelo*, *Inflexible*, *Texas* and other ships, but from various causes—structural weakness in decks, limited arcs of fire,

and the like—the system fell into disuse, and was not revived until the advent of the *Indomitable*. Here again, the restricted off-side arcs greatly limited the all-round utility of the armament, until the improved *Indefatigable*, with her widely spaced gun positions embodying diagonal placing to the most generous degree, showed to the fullest extent what splendid concentration of fire was made practicable by the proper adoption of the principle.

The three-gun turret is as yet untested; and although for some time tentative proposals were put forward in the German and Japanese navies for its introduction, it has fallen to the lot of the Italian Government to be the first to actually embody the mounting in their ships. Theoretically, the three-gun turret is the only solution to the problem of mounting more than twelve big guns to advantage in one hull; space and weight are saved and fire is concentrated, with the disadvantage that all three guns may be put out of action simultaneously.

The foregoing digression from the actual description of the ships has been necessary to explain the main factors which have influenced the various designs. Germany and Japan have fought shy of super-firing guns, *en echelon* turrets—until the *Von der Tann*—and the three-gun turret, with the result that the *Nassau* and *Settsu* present no radical difference from preceding types in the actual placing of their guns. In consequence of this, only 66 per cent. of their armament can be used abeam, and 50 per cent. fore and aft, as compared with the Argentine *Moreno*, also carrying twelve guns and bringing 100 per cent. abeam and 66 per cent. axially.

The *Nassau* carries twelve 11-in., twelve 5·9-in., and sixteen 3·4-in. guns, upon a displacement of about 18,200 tons. In fairness she should not be brought into comparison with ships as yet not completed and of later design, except that, it being still impossible to obtain accurate data of the *Helgoland* class, we must be content to make use of the *Nassau* for the purpose of illustrating design. From all accounts and from what photos are available, the *Helgoland* will mount her twelve 12-in. guns on the same lines as the earlier class and will carry fourteen 6·7-in. guns in the main deck battery; so that for all intents and purposes she is only an enlarged, improved, but otherwise unmodified *Nassau*.

That the design is unsatisfactory is obvious; the acceptance of the principle of super-firing guns or *en echelon* placing of turrets would have produced a far finer fighting machine, but national necessity debarred the experimental construction of such drastic departures from conventional German lines. Time could not be

spared to allow of a trial ship—such as was our own *Dreadnought*—to be built and tested before putting the rest of the programme in hand, and the risk of wholesale failure precluded the first four ships being built to some design introducing hitherto untried dispositions of weights and guns. A heavy broadside was necessary, super-firing guns and *en echelon* turrets were debarred, and so twelve guns were mounted in accordance with the designs of the successful *Braunschweig* class—the four big wing 11-in. turrets replacing small 6·7-in. turrets—and it speaks well for the ability of the German designers that such a heavy armament could be carried upon so moderate a displacement.

From the fact that the *Westfalen* and *Nassau* have been almost continuously in dockyard hands since their trials, we may presume that those structural defects have developed which were almost inevitably bound to occur in the first warships of large displacement ever built in German yards. Even our own *Dreadnought*, designed and constructed by men whose experience was not limited to medium-sized ships, proved far from perfect in many respects; and as the design embodied new methods of internal construction, and novel placing and protection of big guns, the decision of the Wilhelmstrasse authorities to confine their efforts to the production of a type differing so little in general essentials from previous ones is not to be wondered at. The success which has resulted both from gun and speed trials is eloquent testimony to the soundness of this policy of cautious conservatism.

The retention of the medium calibre 5·9-in. gun in the *Nassau* is of course contrary to British practice. Nothing heavier than the 4-in. is as yet suggested for our new ships notwithstanding all the rumours regarding the resuscitation of the 6-in. for anti-t.b. work. Whether the Germans have mounted the 5·9-in. guns for torpedo defence or ship to ship action is immaterial, although the inclusion of the 3·4-in.—an anti-t.b. gun pure and simple—suggests that the latter motive is not unlikely. In any case, however, the system of grouping them in a main-deck battery is faulty and obsolete. It may be argued that when such guns are considered necessary and the design precludes their being disposed elsewhere, the utilization of the main deck *faute de mieux* cannot be found fault with. Granting this, the fact still remains that guns so placed are limited in command and difficult to work in a seaway, and that, if they are to be of real use during and after an engagement, they must be adequately protected, which means extra weight in armour. The 4-in. gun school argues that all this is unnecessary, and that 4-in. guns on turret-tops are

worth 6-in. guns on the main deck and the extra weight might well be dispensed with or distributed to better advantage elsewhere. Which view is correct must be left for time or war to decide; but should 6-in. guns ever again be mounted in British battleships, certain it is that they will be carried up in the superstructures out of the way of blast from the big guns, and having the high command so essential for repulsion of torpedo attack. Target may be thereby increased, but at modern ranges the extra superstructure would not be of much consequence as a mark, while the fighting value of guns placed above the upper deck would be practically doubled.

We may, therefore, dismiss the *Nassau* disposition of turrets as elementary, uneconomical, and likely to give way to one embodying super-firing guns. The same remark applies to the *Settsu* and other ships of the same general type.

Taking the French *Courbet* as the next for consideration, we find a design practically identical in main detail with that of the Brazilian *Minas Geraes* class, *viz.*, two turrets fore and aft on different levels, and one on either beam amidships, in the same cross section.

With such an arrangement 66·6 per cent. of the guns have axial and 83·3 per cent. broadside fire, which gives an excellent all-round efficiency. The first design for the *Courbet* included the 3-gun turret, and was abandoned for the one now decided upon on the grounds that the six turrets, although necessitating increased length, gave less chance of wholesale disablement of guns in action. An elevation of the ship was given on page 219 of our last issue, together with full particulars as to dimensions, etc., so that the brief recapitulation of her armament for comparison's sake will suffice here. The twelve 12·2 guns are disposed in the way already described, and the twenty-two—originally eighteen—5·6-in. guns are carried on the main deck, and arranged in six groups of three and two groups of two guns, the end groups in recesses to allow for axial fire and those amidships in flush embrasures. From many points of view this arrangement is a good one; the guns are well distributed and six can be brought to bear on nearly any given point, while the grouping certainly assists range control. On the other hand, there is always the chance that a shot which disables the centre one may silence the whole three, owing to their lack of isolation.

In comparison with the *Minas Geraes*, the *Courbet* does not show any great advantages resulting from her extra displacement of nearly 4,000 tons, and service opinion in France seems to be more favourable towards the British *Heracles* type with the wing turrets *en echelon*. The



Fig. 1.—German Battleship "Nassau."



Fig. 2.—French Battleship "Courbet."

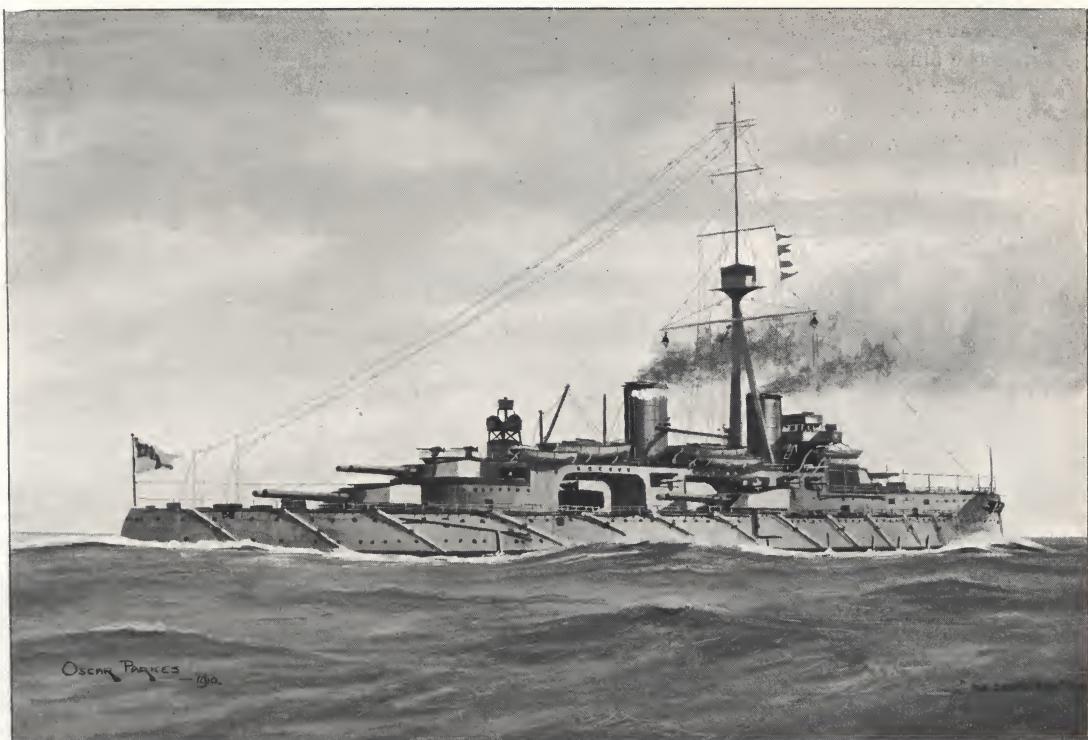


Fig. 3.—British Battleship "Hercules."



Fig. 4.—Russian Battleship "Poltava."

design, however, has now been definitely decided upon and the ships are to be commenced on the 1st August, the *Courbet* at L'Orient and the *Jean Bart* at Brest; no alterations in detail—even alleged improvements—are to be allowed to hinder their construction, which is to be completed in three years from the laying of the keel.

The inclusion of the *Hercules* for comparison with the *Courbet* may seem to suggest that she is the latest word in British design, but as a matter of fact the *Orion* and *Thunderer* classes of an improved *Hercules* type are already on the stocks. Details, however, are being kept secret and practically nothing is definitely known about them. It has been generally accepted that they will carry ten big guns—either 12 or 13·5-in., probably the latter in the *Thunderer*, *Conqueror* and *Monarch*—with an all-centre-line arrangement. Assuming this to be correct, the abolition of the wing turrets and consequent loss of axial fire in favour of the American design, which would probably be something akin to the *Florida*, mark a very important change of policy and tactics at the Admiralty. Hitherto a good deal of allowance has been made so that axial fire should be possible for at least six out of ten guns; but with all five turrets along the keel-line, only four guns will have bearings ahead and astern, while all ten can be trained on either beam, a concentration of fire which postulates the employment of battle formations suitable for broadside practice.

It will be noted that in the *Hercules* both the super-firing of guns and diagonal placing of wing turrets are introduced in order to increase the arcs of fire, with the result that 100 per cent. of the armament has broadside, 80 per cent. astern, and 60 per cent. ahead bearing—the best percentages shown by any design yet projected.

The secondary battery of sixteen 4·7-in. guns is to be carried on top of the turrets and in the superstructures, giving the maximum concentration on any given point of attack. Only one tripod mast is to be fitted, this being similarly placed to that of the *Dreadnought*—the six intervening ships having had two masts. This we believe is due to the adoption of a new system of range-control not so dependent upon the mast stations as has previously been the case. So far as is known, the protection will be similar to that of the *Vanguard*, armour being manufactured by the new Simpson process, which gives 9 $\frac{3}{4}$ inches the same resistance as 11-in. Krupp—or even more from some accounts. No increase has been made in the designed speed, as 21 knots at normal I.H.P. is considered sufficient for all present-day requirements for battleships pure and simple.

It must, however, be remembered that the true comparison with the French, Italian and Russian ships should be made with those of our 1910-11 and 1911-12 programmes, which will be far more powerful than the *Hercules* class. The trend of British line-ship design is towards the battleship-cruiser of immense size and speed, it being highly probable that by the time the *Courbet* is ready for the pennant we shall have 32,000-ton ships steaming 30 knots and carrying guns of either 13·5 or 14·2-in. calibre well on the way towards completion.

Particulars of the new Russian *Poltava* class of four ships have already been published in *Engineering*, and it is from this source that we base our present information. The design is, however, so lacking in essential qualifications and so full of obviously bad points that we venture to express some doubt as to its absolute accuracy, although the fullest particulars have been vouchsafed by our contemporary.

The main armament of twelve 12-in. guns is carried in four immense triple-gun turrets, alleged to be 200 tons heavier than the standard twin-gun turret. These are disposed along the centre-line on one level, so that although all twelve may be trained on each broadside, only three have axial fire ahead and astern.* The turrets may be of exceptional size, but have only 8-in. sides, 3-in. roofs and 12-in. backs—thicknesses which will be quite insufficient to preclude the possibility of the turret as a whole being put out of action by damage or concussion. Our contemporary draws attention to this and other defects in no unsparing manner, stating that only by yawing through 30° on her course could the other turrets be trained ahead or astern.

Then again, the main deck 4·7-in. guns are grouped in pairs at the bases of the turrets, and by reason of their shell-trap ports make it possible for hits, which would otherwise be localised to one gun, to wreck both, at the same time offering the turret bases for attack through these ports. Internally, the magazine arrangements leave much to be desired, those belonging to the 12-in. guns being placed too near the sides of the ship, while the system of bulkheading is considered unsatisfactory by experts in this country. No torpedo tubes are fitted, and the armour has been distributed in accordance with certain principles evolved from war lessons which the Japanese have as yet thought fit to ignore, i.e., thin armour has been placed over the entire hull except a small section aft, the thickest portion of the belts being only 8·8in., with 4·9in.

* The plan of the *Poltava* given in Jane's "Fighting Ships" for 1910 shows the amidship turrets placed diagonally, so allowing an axial fire of nine guns.

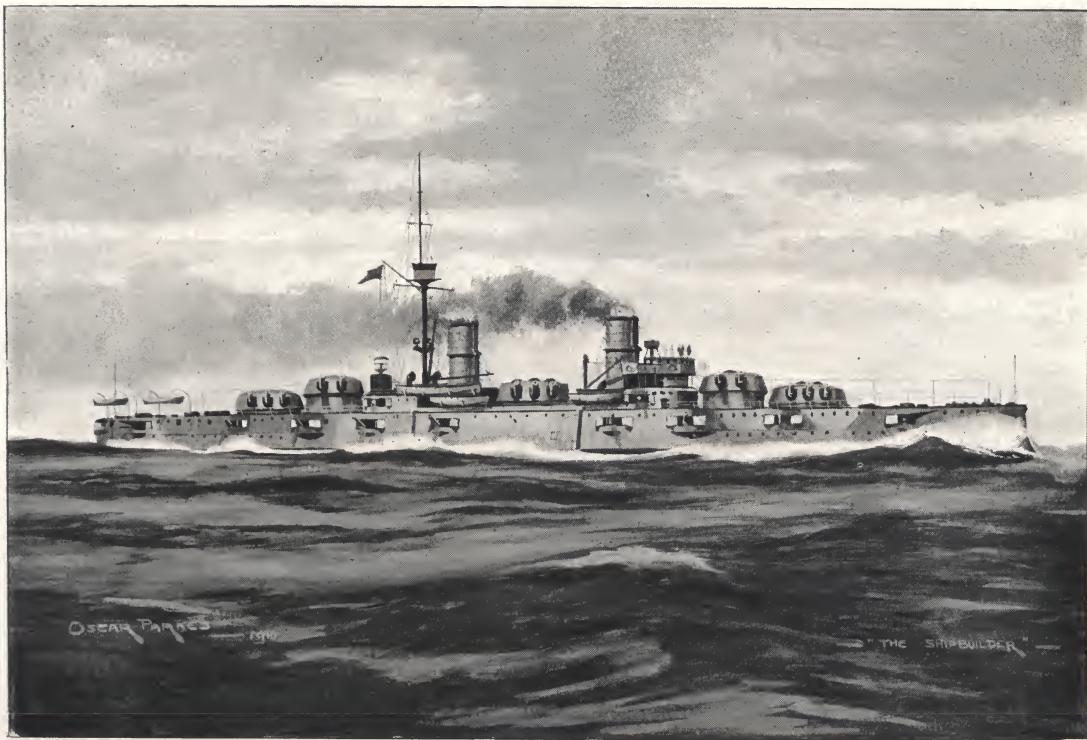


Fig. 5.—Italian Battleship "Leonardo da Vinci."

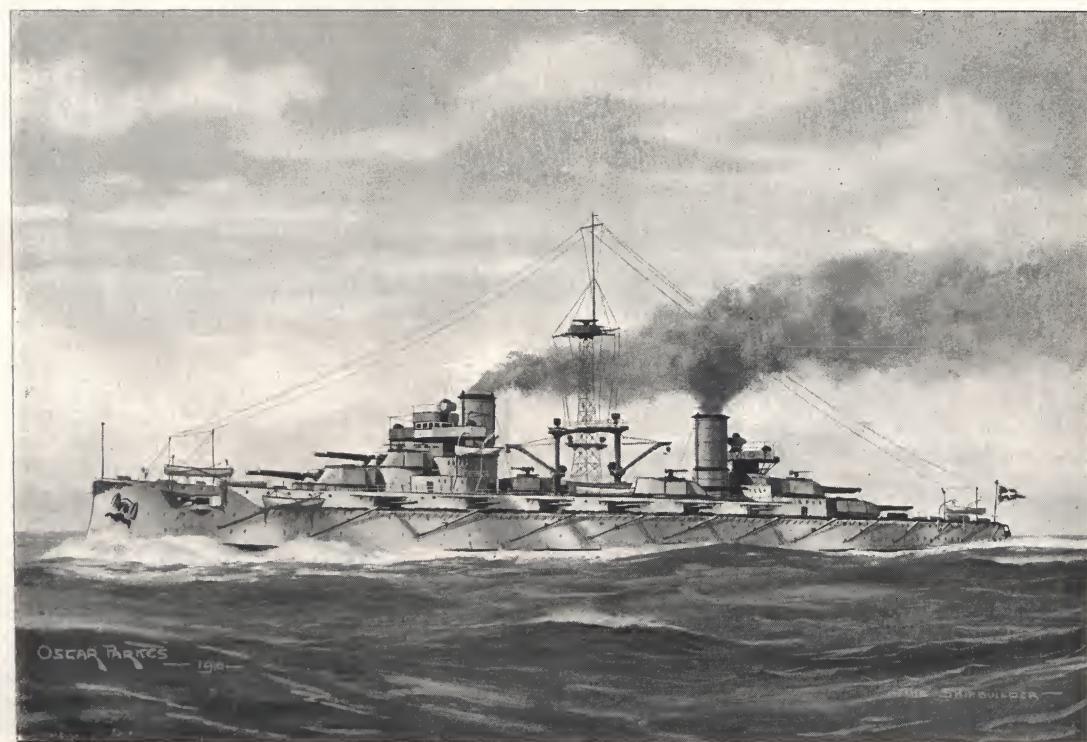


Fig. 6.—Argentine Battleship "Moreno."

on the main deck. Forward the lines have been spoilt by the introduction of an ice-breaker stem—which, incidentally, has not been specially strengthened—while the rudders, although duplicated in the keel-line to avoid the possibility of the ship becoming unmanageable, as she might, through the loss of a single one, are placed in such close proximity that the shot which would destroy one would almost certainly have effect upon the other.

In order to economise weight as far as possible, the scantlings have been made very light, although the employment of high-tensile steel throughout is considered a sufficient safeguard against structural weakness. Whether the test of actual war will substantiate this is a moot

The United States *Florida* belongs to the same general type as the *Delaware* and *Arkansas* classes, excepting that the latter will carry an additional couple of 12-in. guns and have twenty-two 5-in. pieces as a secondary battery. All guns are on the centre-line, but at different levels; consequently the bow and stern fire is not restricted to the fore and aftermost pairs, and the raised turrets have wider arcs of training than would otherwise be the case. The *Florida* differs from the *Delaware* class inasmuch as her 5-in. guns are divided between the main and upper decks—a considerable improvement, as the big sponson forward being raised some eight feet will not catch the bow wave in anything but dirty weather.

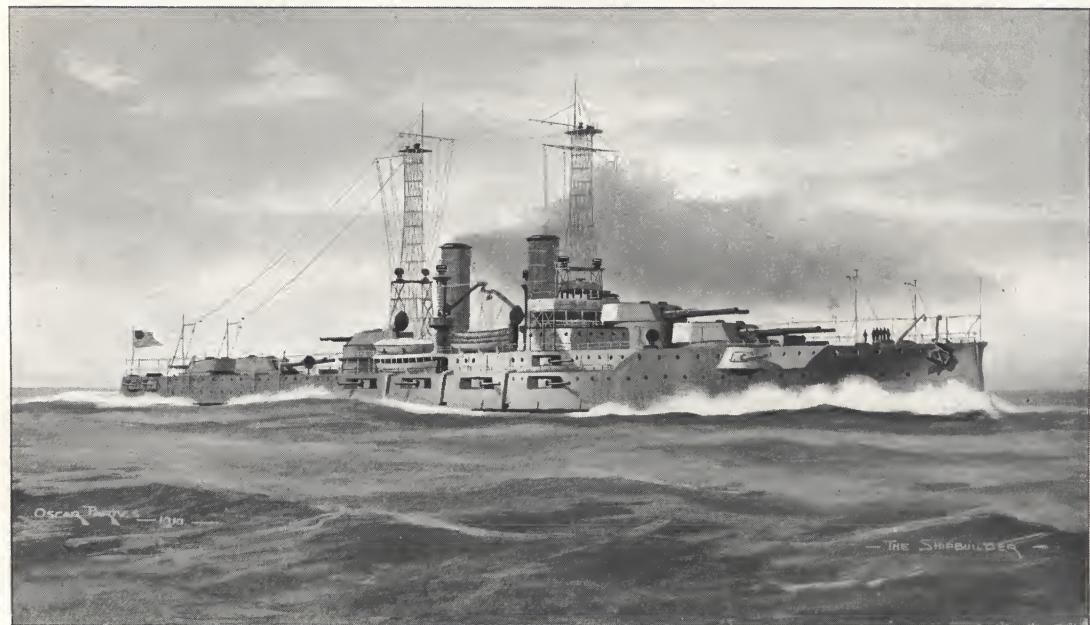


Fig. 7.—United States Battleship "Florida."

point; but the practice of cutting down internal construction weights, in order to compensate for excessive absorption of displacement elsewhere, is not one that finds favour in this country. The speed aimed at—23 knots with 42,000 I.H.P.—seems higher than necessity demands; and we should certainly have considered that had the extra weight of machinery thus introduced been eliminated, and the lines altered forward so as to give an easy 21 knots, the results *in toto* would have been more satisfactory. Finally, we may add that small-tube w.-t. boilers are to be fitted instead of the large-tube type that has been almost universally adopted in other Navies.

The *Arkansas* class, which follow the *Florida*, are to have their 12-in. guns somewhat differently grouped. Three turrets will be on the forecastle and three aft, the middle one in each case being raised to fire over the others. This represents the apotheosis of the two-gun turret centre-line arrangement, and the substitution of the 14-in. piece in the projected 27,000-ton ships is to be the next step forward.

The Argentine *Moreno* and *Rividavia* are at present undoubtedly the finest battleships under construction carrying the 12-in. gun. They can bring eight guns to bear both ahead and astern, and all twelve on either beam, while the 6-in.

TABLE I.—SUPER “DREADNOUGHTS” OF GREAT BRITAIN AND FOREIGN POWERS.

Power.	Vessel	No. in Class	Dimensions (in feet).	Design I.H.P.	Machinery.	Speed (in knots).	Armament.	Completion.		
								A	B	C
Britain	<i>Hercules</i>	3	20,250	515 × 86 × 27	25,000	Turbines	21	10—12” 16—4.7”	1911	9 $\frac{3}{4}$
	<i>Orion</i>	4	22,500	545 × 88 × 27 $\frac{1}{2}$	27,000	do.	21	10—12 or 13.5” ? smaller	1912	9
Germany	<i>Nassau</i>	4	18,204	455 × 88 $\frac{1}{2}$ × 26 $\frac{1}{2}$ (w.l.)	20,000	Reciprocating	19.5	12—11” 12—5.9” 16—3.4”	1909/10	11
	<i>Helgoland</i>	3?	22,000	490 × 90 × 27 $\frac{1}{2}$ (w.l.)	27,000	Turbines	20	12—12” 14—6.7” 20—4.1”	1910/11	11
U.S.A.	<i>Florida</i>	4	23,000	521 $\frac{1}{2}$ × 88 × 28 $\frac{1}{2}$	28,000	do.	20.75	10—12” 16—5” 22—5”	1911	11
	<i>Arkansas</i>	2	26,000	554 × 93 × 28 $\frac{1}{2}$	28,000	do.	20.5	12—12” 12—5” 22—5”	1912	11
Japan	<i>Settsu</i>	2	20,800	480 × 84 × 28	26,500	do.	20.5	12—12” 10—6” 12—4.7”	1912	12.9
	<i>Courbet</i>	2	23,100	540 × 88 $\frac{1}{2}$ × 29 $\frac{1}{2}$	28,000	do.	20	12—12.2” 22—5.6”	1913	10 $\frac{3}{4}$
Italy	<i>Dante Alighieri</i>	1	21,000?	?	30,000	?	23	10—12” 18—4.7” 13—12” 22—4.7”	1912	10
	<i>Leonardo da Vinci</i>	3	22,000	?	35,000	?	23	1913/15	12	10
	<i>Poltava</i>	4	23,000	590 × 89 × 27	42,000	Turbines	23	12—12” 16—4.7”	1913 (?)	8 $\frac{1}{2}$
Argentine	<i>Moreno</i>	2	27,500 to 28,000	604 × 96 × 27	39,500	do.	22.5	12—12” 12—6” 12—4”	1912	12
Brazil	<i>Minas Geraes</i>	3	19,250	530 × 83 × 25 (w.l.)	24,500	Reciprocating	21	12—12” 22—4.7”	1910/12	9
										6

? : Details uncertain. Length given is overall except when stated water-line. French 12.2” gun fires 740lb. shot. A = belt. B = big guns. C = secondary. Figures show maximum thickness in inches.

battery of twelve guns is mounted 19½ ft. above the water-line, which is sufficient to ensure their dryness in almost any weather. The amidship turrets have wide arcs of fire across decks, and a command of 22 ft. ; the foremost guns are about 25 ft. above the w.-l., the raised guns next to these 33 ft., and the two after turrets 25 and 17 ft. respectively. The displacement—27,500–28,000 tons—is the greatest of any warship as yet in hand, while the length made necessary by the six turrets is 604 ft., or over 80 ft. in excess of the *Dreadnought's* overall dimension. The total approximate cost will be £2,200,000 each. The torpedo tubes are to project the new 21-in. weapon. Particulars as to protection and machinery are given in Table I.

Along with Russia, Italy has decided to adopt the three-gun turret, and both the *Dante Alighieri*—the launch of which has been provisionally fixed for the 20th September, at Castellammare—and *Leonardo da Vinci* types are to carry turrets of this design in addition to two-gun turrets. The first-named vessel will have ten 12-in. guns, three in each of the end positions and four in pairs firing over these. A secondary armament of eighteen 4·7 guns will be carried along the main deck, eight being in small double turrets at the ends of the battery and the remainder spaced between them. The later *Giulio Cesare*, *Conte di Cavour*, and *Leonardo da Vinci*, will have thirteen 12-in. guns—an extra three-gun turret being placed amidships—and twenty-two 4·7-in. in the small superstructures and along the main deck. This is, of course, the biggest armament yet put

into a warship, and will probably prove too much for proper range-control. The baptismal armament consisted of eight 13·5-in. guns, and the reason why a hark-back to the smaller calibre was decided upon is uncertain. Probably the absence of experimental data and trial pieces was the governing factor, as thirteen 12-in. guns seems an excessively heavy armament to crowd into a single ship. Should the trio materialize with the arsenal of artillery at present allotted to them, their gun trials will be watched with interest.

In conclusion, a brief survey of the designs of the super-*Dreadnoughts* selected will show how former prejudices are being overcome by the demands of progress. Increased numbers of big guns, all firing on either broadside, have brought in the *en echelon* placing of turrets, which in turn is giving way to centre-line disposition, while the much-derided three-gun turret will have a chequered existence pending the introduction of the giant guns, which limitation in the number of 12-in. makes inevitable. Dimensions will keep on growing, until, as Admiral Bacon predicts, the battleship will be a squadron in herself, and then perhaps will come a return to moderate dimensions with mixed armaments and another gradual cycle of evolution terminating in some ship as different from the *Dreadnought* as that vessel is from the *Victory*. Great developments in gun power and propulsion are in sight, and prophecy beyond the immediate future is well-nigh impossible.



ACCORDING to the shipbuilding returns just issued by Lloyd's Register, there were 394 mercantile vessels of a gross tonnage of 1,118,587 under construction in the United Kingdom at the 30th June, 1910. This quantity is about 61,000 tons greater than the tonnage in hand at the end of the previous quarter (31st March), and also exceeds by nearly 373,000 tons the total building twelve months ago. The mercantile work in hand is divided among the principal centres as follows:—At Belfast, 227,500 tons; Barrow, Maryport, and Workington, 3,180 tons; Glasgow, 228,534 tons; Greenock, 159,297 tons; Hartlepool and Whitby, 65,283 tons; Liverpool, 29,380 tons; Middlesbrough and Stockton, 70,967 tons; Newcastle, 194,537 tons; and Sunderland, 108,500 tons. During the quarter ending 30th June, 189 vessels, of 394,676 gross tons, were commenced, and 193 vessels, of 345,443 tons, were launched. As

regards naval construction, there were under construction in the United Kingdom at the 30th June 66 warships, with a total displacement of 378,523 tons, as compared with 77 warships, with a displacement of 303,685 tons, at the 31st March. Of this total, 10 vessels (2 battleships, 2 armoured cruisers, 2 third-class cruisers, and 4 submarines), representing 96,080 tons, were building in the Royal Dockyards; while private shipbuilders had in hand 50 vessels (5 battleships, 3 armoured cruisers, 8 protected cruisers, 29 destroyers, and 5 submarines), representing 239,193 tons, for the British Government, and 6 vessels (2 battleships, 1 scout, and 3 destroyers), of 43,250 tons, for foreign governments or "not stated." The returns from foreign and colonial centres received during June show that there were 263 mercantile vessels, of 529,600 gross tons, building out of the British Isles.



OUR HEADLIGHTS

No. 12.—THE RIGHT HON. LORD FURNESS.

THE announcement, made three weeks ago, that His Majesty had been pleased to confer a peerage on Sir Christopher Furness gave unqualified satisfaction in industrial and commercial circles, and it is, therefore, peculiarly fitting that on this occasion we should devote our "Headlight" article to a sketch of the career of the new peer and present our readers with his portrait.

Born at West Hartlepool on the 23rd April, 1852, our "Headlight" was the seventh son of the late Mr. John Furness, of West Hartlepool, and of Averill, a daughter of Mr. John Wilson, of Naisbit Hall, County Durham. Seventh sons, according to the folk lore of the North Country, are invariably born under a lucky star. Be that as it may, his career may well be cited as proving the truth of the adage, though in this prosaic age one sees in his natural shrewdness and great commercial ability, backed up as they have been with indomitable courage and inexhaustible energy, the keynote to a life's success, which, when its story is fully written, will take rank as one of the romances of modern life.

Christopher Furness received his early commercial experience under his eldest brother, whose firm carried on a large business as importers of foreign produce. In 1870, young Furness went to Sweden, Denmark and Germany on the firm's business. At that time a great part of the food stuffs imported into the North-East Coast ports came via Hamburg, but on the outbreak of the Franco-German war that port was summarily closed. Hearing the news at Gothenburg, and there being no time to communicate with his firm, Mr. Furness acted on his own initiative and bought large quantities of produce. The operation proved an unqualified success, and thus, at the early age of eighteen, he demonstrated the possession of that faculty for discerning

a coming opportunity which has stood him in good stead over and over again during his remarkably successful business career.

Thus boldly handled, the operations of the Furness firm quickly gained in impetus, and it was not long before they were dealing with such large consignments of produce from America that they were led to acquire an interest in a number of sailing ships trading from the United States to the North-East Coast ports. The first regular Atlantic traders to Hartlepool were sailing ships, and it was not until 1874 that the firm acquired their first steamship. A few years afterwards, Mr. Christopher Furness (as he then was) and his brother dissolved partnership, the former to carry on a shipowning and shipbroking business and the latter the original provision trade. But shipowning alone did not satisfy Mr. Christopher Furness, and he speedily turned his attention to shipbuilding, acquiring in the year 1883 a controlling interest in the firm of Edward Withy and Company, shipbuilders, of Hartlepool, and ultimately amalgamating it with his own concern under the style of Furness, Withy and Company, Limited. To-day, in addition to owning fleets of steamers which fly the Furness flag in every part of the world, the company have vast interests in collieries, iron-works, ship and engine building, and other industrial enterprises both at home and abroad, their operations being conducted on a truly gigantic scale.

Lord Furness may indeed be described as the largest individual shipowner in the world. According to Lloyd's Register, the principal shipping companies which he controls own about 135 vessels, and this figure does not take into account ships added to the various fleets this year or now under construction. The part played by his lordship during the last few years in the development of shipping has been considerable.

He was one of the first to see the great economy of the big cargo carrier on the North Atlantic, and about the year 1896 he commenced to build vessels for this trade capable of carrying dead-weight cargoes of 10,000 to 14,000 tons, many of which, notwithstanding the growing competition of the intermediate liners, are still doing well trading between American and British and Continental ports.

Lord Furness's connection with the industry with which this journal is specially concerned, however, is possibly of still greater interest to our readers than his shipowning enterprises. He is chairman or has a seat on the board of directors of four shipbuilding and marine engineering companies, *viz.*, Irvine's Shipbuilding and Dry Docks Company of Hartlepool and West Hartlepool, the Northumberland Shipbuilding Company of Howdon, Palmers Shipbuilding and Iron Company of Jarrow, and Richardsons, Westgarth and Company of Hartlepool, Middlesbrough and Sunderland. Last year these four companies jointly produced new vessels of a total gross tonnage of about 100,000 and machinery of over 100,000 horse-power.

The subject of our sketch, however, does not by any means confine his energies to shipowning, shipbuilding and engine-building. He is heavily interested in the iron and coal trades, in railways, banking, and insurance, being chairman or a director of the Broomhill Collieries, the Weardale Steel, Coal and Coke Company, the Cargo Fleet Iron Company, the South Durham Steel and Iron Company, the Wingate Coal Company, the Easington Coal Company, the Tees Side Bridge and Engineering Works, the Tees Furnace Company, the Metropolitan Railway Company, the North Eastern Banking Company, the National General Insurance Company, the World Marine Insurance Company, etc. The foregoing, though by no means a complete list, will serve to indicate the magnitude of the commercial enterprises with the control of which this great captain of industry is so intimately connected. It may be added that the *employés* of his companies are computed to number no less than forty thousand persons with an annual pay roll of over two millions sterling.

How our "Headlight" manages to keep his

finger on the pulse of all these widely divergent interests must ever remain a mystery to the man in the street; yet, in spite of all, he has found opportunity to devote more time than most men to the study of politics and social and economic questions, and represented his native town in the House of Commons for many years. Politically he is a staunch Liberal and keenly interested in all legislation having for its object the welfare of the masses. His practical interest in the working classes found expression in the co-partnery scheme which he instituted in his Hartlepool shipyards last year; and although its continuance has been voted against by the workmen—owing largely, we fear, to prejudice—all will agree that, in giving much thought to bringing about a better understanding between capital and labour, he was actuated by the highest motives, and deserved, if he has not yet commanded for the idea, complete success.

Lord Furness married, in 1876, Jane Annette, only daughter of the late Mr. Henry Suggitt, of Brierton, County Durham. Their only surviving child is the Hon. Marmaduke Furness, who resides at Cundall Manor, in Yorkshire, and farms his own land there. His Lordship is a large owner of land in the North of England and elsewhere, and is Lord of the Manor of Grantley in the West Riding of Yorkshire, where he principally resides. Imbued with an ardent desire to witness the commerce and industry of his native country palpitating with such vitality as shall ensure our continued supremacy among the nations of the world, and having himself gathered abundantly of the fruits of honest toil and perseverance, Lord Furness belongs to that class of philanthropist which gives with quiet discrimination, and many men who have attained eminence in various walks of life look back with gratitude to timely help received at periods of crisis. Of his many gifts for religious and charitable purposes, possibly one of the most highly appreciated was the sum of £20,000, set aside to found pensions for aged seamen. In 1895 he received a knighthood at the hands of the late Queen Victoria, and the peerage just conferred fittingly signalises the nation's appreciation of his immense services to industry and commerce.

THE old Cunard liner *Umbria* was beached at the yard of the Forth Shipbuilding Company, Bridgeness, a few weeks ago, for the purpose of breaking up. Thus passes the famous ship which, together with the *Etruria*, broke all Atlantic records shortly after she came out in 1884.

A professor of naval architecture is about to be appointed at the Technical High School, Trondhjem, Norway, and applications are invited in an announcement which will be found in our advertising columns.

CURRENT TOPICS

By a Naval Architect.



Bureau Veritas New Rules.

ANIMATED by the progressive spirit which has always characterised their policy, the Bureau Veritas have carefully revised their Rules with a view to meeting present-day requirements. The 1910 edition, just published, contains a number of modifications, of which the more important are drawn attention to in a circular accompanying the new Rules, as follows :—

In thicknesses of material one-fiftieth of an inch has been adopted instead of one-thirty-second.

The term "full-deck" has been adopted as descriptive of vessels which comply fully with the requirements of the Rules, and which are thus entitled to the maximum draught of water allowed by the Freeboard Tables of the Bureau Veritas.

The scantlings of "spar-deck" and "awning-deck" vessels will be determined in accordance with the designed draught of water. In other words, the scantlings of such vessels will be derived from those of the "full-deck" type by reducing those of the "full-deck" vessel proportionately to the draught of water in the two cases, but with a certain maximum reduction as definitely specified in the Rules.

In all cases, the sheerstrake and upper-deck stringer and deck plating are to be placed at the level of the uppermost deck of the vessel. This arrangement of material will hold good also in the case of a bridge house having a length greater than indicated in the tables. In way of such bridge house the strength material will be located at the level of the bridge deck, and the deck below same will be regarded as the second deck, all as described in the Rules.

The tables of framing provide for two systems :—(1) without web frames, and (2) with web frames. The previous diagrammatic method of specifying the depth of framing has given place to a tabular form. Each table for framing has been arranged according to the number of decks in the vessel, and sketches side by side with the tables indicate clearly the arrangement contemplated.

The system of framing with hold stringer and wide-spaced hold beams has been confined to the single-deck type of vessel.

Corrections for proportions are now determined by modifying the longitudinal numeral, and not as formerly by a special table.

The scantlings, on the whole, have been slightly reduced as compared with the requirements of previous editions, but not in any case to such an extent as to affect the strength or safety of the vessel. While the scantlings have been slightly reduced, the strength has been fully maintained by re-arrangement of the material.

Many of the articles have been re-modelled and tables amplified, to suit the changes referred to. Other articles which have not been so dealt with are under consideration, and will be revised in a future edition, which will also include particulars regarding French Standard profiles, a matter which is not yet completely arranged.



The Survey of Internal Combustion Engines for Marine Purposes.

AN important addition has just been made to the Rules of Lloyd's Register dealing with the survey of internal combustion engines for marine purposes. The recognition thus accorded by the premier classification

society should do much towards the development of this class of propelling machinery. Section 1 of the new rules states that, as regards testing of material, the rules will be the same as those relating to steam engines. In section 2 the construction of internal combustion engines is dealt with, and various undesirable features are provided against. Rules for determining the sizes of shafts are given in section 3 for ordinary mild steel, but smaller sizes will be considered for special steel. The formulæ to be used are as follows :—

For Petrol or Paraffin Engines for smooth water services :—

$$\text{Diameter of crank shaft in inches} = C \sqrt[3]{D^2 S}$$

where D = diameter of cylinder in inches,
 S = stroke of piston in inches.

Four Stroke Cycle.	Two Stroke Cycle.	Bearing between each crank.	Two cranks between the bearings.
For 1, 2, 3, or 4 Cyls.	1 or 2 Cyls.	$C = .34$	$C = .38$
„ 6 „	3 „	$C = .36$	$C = .40$
„ 8 „	4 „	$C = .38$	$C = .425$
„ 12 „	6 „	$C = .44$	$C = .49$

For open sea service add .02 to C .

$$\text{Diameter of intermediate and screw shafts in inches} = C \sqrt[3]{D^2 S (n+3)}$$

where D = diameter of cylinder in inches,
 S = stroke of piston in inches.
 n = number of cylinders.

For smooth water services—

$C = .155$ for intermediate shafts.

$C = .170$ for screw shafts fitted with continuous liners.

$C = .180$ for screw shafts fitted with separate liners or with no liners.

For open sea services—

$C = .165$

$C = .180$

$C = .190$

which very high initial pressures are employed, particulars should be submitted for special consideration.

Section 4 deals with fuel tanks and connections. Among the requirements of this section, it may be mentioned that separate fuel tanks are to be tested with all fittings to a head of at least 15ft. of water; separate tanks are to be provided with metal-lined trays to prevent any possible leakage from flowing into the bilges or saturating wood works; all fuel pipes are to be of annealed seamless copper with flexible bends; and an approved fire-extinguishing apparatus must be supplied. With regard to periodical surveys, section 5 requires the machinery to be submitted to survey annually.



The Corrosion of Non-Ferrous Metals.

THE Council of the Institute of Metals have decided to undertake an investigation into the causes of the corrosion of non-ferrous metals by sea water, acids, etc., and by other chemical and electrolytic reactions, and have appointed a Committee for the purpose of carrying out the investigations. The following are the names of the members of the Committee :— Sir Gerard Muntz (president of the Institute of Metals), chairman; Professor H. C. H. Carpenter (University of Manchester); Engineer-Captain G. G. Goodwin, R.N. (Deputy Engineer-in-Chief, Royal Navy); Professor A. K. Huntington (University of London); Mr. J. T. Milton (Chief Engineer Surveyor, Lloyd's Register of Shipping); Mr. A. Phillip (Admiralty chemist); Mr. Leonard Sumner (Broughton Copper Company); Professor T. Turner (University of Birmingham); and Sir Wm. H. White (past-president of the Institute of Metals). The Committee have decided in the first instance to confine their attention to the question of the corrosion of condenser tubes in marine engines, and in stationary engines using foul water or subject to violent electrolytic action. Before beginning experimental research they propose to have prepared an epitome of such information on the subject as is already available from previous research in the same direction. Mr. G. D. Bengough, of the Metallurgical Department of the University of Liverpool, has been asked to undertake this work and to become a member of the Committee.



Riveted Connections.

It is well known that the friction or adhesion between the pieces connected considerably increases the

strength of a riveted joint, more especially when the work has been done for some time and the pieces have rusted together; but the difficulty of assigning a definite value to the effect of this adhesion has led to its being ignored in the usual method of calculating the strength of riveted connections, with the result that a much larger factor of safety really exists than would appear from the calculations. The matter has recently been dealt with experimentally by M. Barillon, of the French Navy, a summary of his instructive experiments being given in a paper read before the last meeting of the Association Technique Maritime. For these experiments a number of plate strips were prepared 4in. wide and .55in. thick, so that different materials for the rivets and various methods of riveting could be tested.

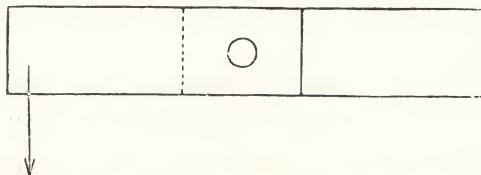


Fig. 1.—Turning Plate round Rivet.

Each test piece was formed by three strips, one strip being held between the other two by a 1-in. rivet. Round washers .55in. thick and 2.36in. diameter were placed between the plates and around the rivet. The force necessary to turn the plate round the rivet for a known leverage, as indicated in Fig. 1, was measured under four different conditions as follows:—

- The first series of experiments were made with 23.6in. leverage immediately after making the joints.
- The second series were made with 21.2in. leverage, the force being applied in the contrary direction to straighten the test pieces shortly after the first series.
- The third series were made with a leverage of 23.6in. after leaving the test pieces exposed to the tide, *i.e.*, alternately exposed to air and water for one month.
- The fourth series were made in the contrary direction with 21.2in. leverage to straighten the test pieces after they had remained in the laboratory for six months after the third series.

The results are given in Table I., O denoting carbon steel and N nickel steel rivets.

TABLE I.

	a lbs.	b lbs.	c lbs.	d lbs.
1O Hydraulic riveted	755	744	644	1082
2O Do. do.	733	656	699	1129
3O Pneumatic hammer	733	800	721	1061
4O Do. do.	446	556	512	964
1N Pneumatic hammer until rivet gets cold	578	744	732	1172
2N Do. do.	534	666	621	1082
3N Pneumatic hammer until rivet gets dull red	424	402	424	907
4N Do. do.	622	688	600	842
5N Hydraulic riveted	556	711	490	842
6N Do. do.	920	920	820	1302
7N Hydraulic riveted, the rivet remaining under pressure for one minute	534	534	566	885
8N Hand riveted	666	676	765	1172
9N Do. do.	446	534	522	820

Putting aside 3N, 4N and 7N, which are abnormal, it will be seen that at the end of six months the effect of adhesion has increased 50 per cent. (compare columns b and d), so that these experiments leave no doubt as to the beneficial influence of adhesion upon the strength of the connections.



A Novel American Torpedo Boat.

A TORPEDO boat, or boat-torpedo, of novel construction, according to *Engineering News*, has been acquired for the United States Navy. The vessel consists of two hulls, one of a submarine character, containing the propelling and other machinery, suspended beneath the other which floats on the surface. The submarine portion also holds an explosive charge of 1,000 lbs. of gun cotton. In operation the boat-torpedo is to be navigated by a crew of two men, located in the upper portion, to within striking distance of the hostile battleship, when the helm is locked and the engine is set at full-speed ahead. At this juncture the men are expected to make their escape by means of buoys or small boats, to be rescued later. It is, however, possible that an alternative design may be adopted for the construction of subsequent boat-torpedoes, whereby they will be fitted with submerged torpedo tubes. Provided this vessel passes her trials successfully, the United States Navy Department is authorized to contract for two others. The present vessel, the cost of which is about £4,500, was built at a Boston shipyard last year, and is the invention of Mr. C. L. Burger, of New York. It is understood that the required speed of 16 knots has been exceeded.

Longitudinal Bending Moment Calculations for Ships.

moment, as for example in the case of a ship resting upon a wave crest or hollow amidships, the maximum bending moment can be calculated without drawing the complete curves of loads, shearing forces, and bending moments for all positions in the length. The bending moment curve, being the integral of the shearing force curve, reaches a maximum at the section where the shearing force equals zero. For the shearing force to be zero, the total weight and total buoyancy upon one side of this section must be equal to one another; and therefore, by finding the point in the length where this state of affairs exists, the point of maximum bending moment is also determined. The value of this moment can then be readily found as follows:—

IT is sometimes forgotten that for conditions under which there is a well-defined bending

Let W_a = Weight of ship aft of amidships.
 w = Weight per foot of ship at amidships.
 l = Centre of gravity of W_a from amidships.
 B_a = Buoyancy of ship aft of amidships.
 b = Buoyancy per foot of ship at amidships.
 m = Centre of buoyancy of B_a from amidships.

If $W_a = B_a$ the shearing force is zero at amidships, and the maximum bending moment is therefore amidships and equal to $W_a (l - m)$. Generally this will not be the case, and the shearing force will be zero at a distance d from amidships such that

$$W_a + wd = B_a + bd$$

$$\text{i.e., } d = \frac{W_a - B_a}{b - w}$$

and the maximum bending moment will be

$$M_{\max.} = W_a l - B_a m + \frac{(W_a - B_a)d}{2}$$

To give a numerical example

Let $W_a = 7,500$ tons, $l = 120$ ft., $w = 26$ tons.

$B_a = 7,800$ " " $m = 80$ " $b = 76$ "

$$\text{Then } d = \frac{7,500 - 7,800}{76 - 26} = \frac{-300}{50} = -6 \text{ ft., i.e.}$$

6 ft. aft of amidships,

$$\text{and } M_{\max.} = 7,500 \times 120 - 7,800 \times 80 + \frac{(7,500 - 7,800)(-6)}{2}$$

$$= 900,000 - 624,000 + 900$$

$$= 276,900 \text{ ft.-tons,}$$

i.e., the maximum bending moment is 276,900 ft.-tons and occurs at 6 feet aft of amidships. This figure can be checked by working from the forward end, when an identical value should be obtained.

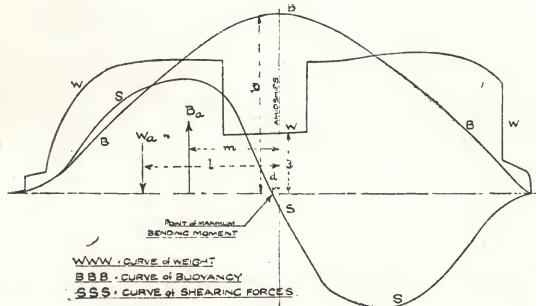


Fig. 2.—Diagram showing the Point of Maximum Bending Moment.



Trials of the Brazilian Battleship "São Paulo."

THE Brazilian battleship *São Paulo*, built and engined by Messrs. Vickers, Sons and Maxim, Limited, at the Naval Construction Works, Barrow-in-Furness, carried out her official trials on the Clyde in May, less than a month elapsing from the dry-docking of the vessel in Liverpool and coaling at Greenock to the completion of all speed and gun trials. The vessel is a sister ship to the *Minas Geraes*, built by Sir W. G. Armstrong, Whitworth and Co., Limited, Elswick, and described and illustrated in a recent issue.* The trials of the *São*

Paulo, which were superintended by the Brazilian Naval Commission, of which Admiral Bacellar is president, were of a very exacting nature, being even more severe than those obtaining in the case of ships built for the British Navy.

The first trial was one of 48 hours' duration, and was carried out with the idea of determining the coal consumption at cruising speed. The vessel ran at 10·6 knots with an indicated horsepower of 2,383, and the coal consumption was considered very satisfactory, as it will allow a radius of action of 12,913 miles, or 2,913 miles in excess of that stipulated in the contract. On

the 30 hours' trial at three-fourths speed, the vessel attained 19.85 knots with the engines developing 17,377 I.H.P. The full-power trial resulted in a speed of 20.99 knots, and for six runs on the measured mile 21.23 knots was obtained with 25,577 I.H.P. On two special runs over the measured mile, with the object of ascertaining the highest possible power that could be obtained with safety, the power was no less than 28,645 I.H.P. and the speed 21.623 knots. On the 31st May the vessel proceeded to sea for a six hours' trial in order to test the oil-fuel installation, which was found to work satisfactorily. During some of these trials very indifferent weather was experienced, the wind blowing half a gale, with hail and sleet.

tenths of a knot of that of the *São Paulo*. As, however, the horse-power developed by the latter vessel was slightly greater, and as the machinery is identical in the two ships, both may be taken as equal to a speed of 21.6 knots, or six-tenths of a knot in excess of the contract speed. Considering the limited draught of water imposed by the South American harbours and the great offensive and defensive qualities possessed by both battleships, their speed must be regarded as eminently satisfactory.

On the 1st June the *São Paulo* preceeded down the Clyde beyond Ailsa Craig for her gun trials. Not only were the guns fired at extreme degrees of elevation and depression to test the gun mountings, but trials were also made to test the



The Brazilian Battleship "São Paulo" on Full-power Trial.

Compared with the performance of the *Minas Geraes*, which was also engined by the Vickers Company, the *São Paulo* on trial proved herself the slightly faster vessel. On the two special runs at fullest power the Elswick-built vessel obtained 21.43 knots, which was within two-

rapidity of fire. An unprecedented test, particularly in regard to the vessel's structure, was the firing of 21 guns on the broadside—ten 12-inch and eleven 4.7-inch. Admiral Bacellar touched the key which simultaneously sent the 21 projectiles from six to twelve miles.

THE steamer *Port Curtis*, referred to in our Launches' columns, is the thirty-fourth vessel built by Messrs. R. & W. Hawthorn, Leslie and Co., Hebburn, for Messrs. William Milburn and Co., London, and another steamer for the same

owners is now on the stocks. The gross tonnage of the vessels ordered by Messrs. Milburn from the Hebburn company is 136,000, with a dead-weight capacity of about 175,000 tons, and the total cost was over 1 $\frac{3}{4}$ millions sterling.

Shipbuilding Centres

FROM OUR OWN
CORRESPONDENTS.



FRANK & SONS,
SOUTH SHIELDS

SCOTLAND.

To the large amount of naval tonnage under construction, or afloat fitting out, on the Clyde for the British Navy, which in the notes in our last issue we referred to as unprecedented, there have now to be added no fewer than ten new torpedo-boat destroyers. This forms one half of the whole number so far placed of the twenty-three vessels provided for in the Navy Estimates for the current year. Of the six "special" boats which were, to begin with, given out to particular builders, who are to be allowed a freer hand than usual in modifying details and securing the best possible results, four were placed on the Clyde—two with Messrs. Yarrow & Co., Scotstoun, and two with Messrs. William Denny and Brothers, Dumbarton—although in the latter case only the hulls are to be built at Dumbarton, the machinery being supplied by the Parsons Marine Steam Turbine Co., Wallsend-on-Tyne, who are, in fact, the responsible contractors. Of the fourteen other vessels, given out somewhat later, but practically of the same class although "standardisation" is more regarded in their case, three are to be built by Messrs. John Brown and Co., Clydebank, two by Messrs. Wm. Denny and Brothers, Dumbarton, and one by Messrs. Wm. Beardmore & Co., Dalmuir. The propulsion of the six special boats will be by twin screws, driven in the case of Messrs. Yarrow & Co.'s two by Brown-Curtis turbines, and in the two built at Dumbarton by geared turbines of the Parsons type. If, as is likely, the three vessels which are to be built by Messrs. John Brown & Co., Clydebank, are fitted with Brown-Curtis turbines, as many as nine of the twenty vessels given out will be propelled by twin screws. Altogether £621,906

is appropriated in the current estimates for the twenty vessels, and for the three which have yet to be placed only £10,848.

While in respect of tonnage merely the destroyer contracts do not augment the work in hand to an extent commensurate with their monetary consequence, still they add considerably to the total tonnage, and on a rough, but safe, estimate Clyde builders have booked during April, May and June between 120,000 and 125,000 tons of new shipping. The following principal orders—other than those for naval ships—may be enumerated:—Messrs. John Brown & Co., Clydebank, a twin-screw steamer of about 12,000 tons for the Orient Steam Navigation Co.; the Fairfield Shipbuilding and Engineering Co., Govan, and Messrs. Barclay, Curle & Co., Whiteinch, each a large twin-screw steamer for the Union-Castle Mail Steamship Co.; Messrs. Wm. Denny and Brothers, Dumbarton, a large passenger steamer for the New Zealand Shipping Co.; Scott's Shipbuilding and Engineering Co., Greenock, a steamer of 10,000 tons for Messrs. Holt and Co., Liverpool; Messrs. Alexander Stephen and Sons, Linthouse, a large fruit-carrying steamer for Messrs. Elders & Fyffes, London; Messrs. Charles Connell & Co., Scotstoun, a cargo steamer of 8,400 tons D.W. for Messrs. Thomas Law and Co., Glasgow, and one of 8,500 tons for Messrs. James Gardiner & Co., Glasgow; Messrs. D. and W. Henderson & Co., Partick, a large steamer for Italian owners; Messrs. A. McMillan & Son, Dumbarton, a steamer of 9,250 tons carrying capacity for Messrs. Pearson & Co., Glasgow; Messrs. Russell & Co., Port Glasgow, a cargo steamer for Messrs. Warrack & Co., Leith, and

one 450ft. long for Messrs. Charles Barrie & Sons, Dundee; Messrs. A. Rodger & Co., Port Glasgow, a large cargo steamer for Messrs. Hugh Hogarth and Sons, Glasgow; and Messrs. Murdoch and Murray, Port-Glasgow, three steamers for service on the Amazon and one for South American owners. The customary variety characterises the remaining and smaller contracts, items which may be referred to being a powerful twin-screw 2,000-ton "Simons" cutter hopper dredger for the Durban Port Authorities, booked by Messrs. Wm. Simons & Co., Renfrew; a self-propelling bucket dredger and two hopper barges for the Leopoldina Railway Co., an 800-ton barge for the Manchester Ship Canal Company, and a twin-screw dredger for foreign owners, by Messrs. Lobnitz and Co., Renfrew; a suction-grab dredger for the London and North-Western Railway Co., by Messrs. Ferguson Brothers, Port-Glasgow; two small steamers for foreign owners, by Messrs. Napier & Miller, Old Kilpatrick; a small steamer for service on the Amazon, by Messrs. Ritchie, Graham & Milne, Whiteinch; six light-draught vessels aggregating 500 tons, by Messrs. Alley and McLellan, Polmadie; and four large barges for foreign owners, by Messrs. D. M. Cumming and Co., Blackhill.

During April Clyde builders launched 56,420 tons of new shipping, during May 37,520 tons, and during June 32,200 tons. With an output for the preceding three months of over 90,000 tons, the aggregate output for the first six months of this year approaches 217,000 tons, which, barring serious trouble resulting from the wages unrest which has for some time obtained, promises to raise the year 1910 to the rank of a record year, although it is some 120,000 tons short of the figures for the first half of 1906.

As regards the wages question, at the time of writing arrangements have been made for a further conference to be held at Edinburgh on the 12th July between the Executive Board of the Shipbuilding Employers' Federation and representatives of the eighteen trade unions which are parties to the national working agreement in the shipbuilding trade. The first meeting, held at Carlisle on the 6th June, was adjourned by mutual consent for a month. The committee of the trade unions, acting on behalf of their members working in the federated shipbuilding yards all over the country, have applied for an advance of 5 per cent. on piece-work rates, and 1s. per week on time rates or $\frac{1}{4}$ d. per hour where payment is made by the hour. Negotiations at the moment are also proceeding for a conference to be held at York, probably in the same week, to discuss the wages question affecting the Clyde branches of the Engineers' Society.

Notable events in connection with ship launches and trial trips have been numerous during the period since the notes for last issue were penned. As regards launches, one day in particular reached the high-water mark of activity. On Saturday, 9th April, three vessels were sent off the stocks, each in some respect or other out of the ordinary. Of greatest note, and of more than usual interest as regards naval work, was the launch on that day of the 20,250-ton battleship *Colossus* for the British Navy. This mighty warship took the water splendidly from the works of Scott's Shipbuilding and Engineering Co., Greenock, and the event marked almost a record in rapid construction. Although the intimation of the Admiralty's intention to give Scott's Company the order for the battleship was received on the 5th May, the official contract was not given until two months later. It was, therefore, not until the 19th July that the first rivet was driven through the keel plate, so that the whole time occupied in the building of this—with the sister ship *Hercules* the largest battleship afloat—was less than nine months. At Dumbarton, by the same tide, Messrs. Denny & Brothers put into the water the torpedo-boat destroyer *Yarra*, the second of the Australian Commonwealth fleet. The third vessel was the 1,000-ton twin-screw yacht *Doris*, a handsome and palatial pleasure craft built for Mr. S. B. Joel, sent off the stocks of Messrs. John Brown & Co., Clydebank.

In the works of the last-named firm the keel of the *Dreadnought* cruiser which they are to build for the Australian Government was ceremoniously laid on the 23rd June by Sir George Houston Reid, High Commissioner in London for the Commonwealth. The company about the same date completed the trials of the ocean-going torpedo-boat destroyer *Beagle*, and it was handed over to the Admiralty officers, under whose charge it left the Clyde for Devonport. The *Beagle* is the first of the class of sixteen vessels of the 1908-9 programme, and the actual contract for her was placed about the end of January, 1909. Her keel was laid on the 17th March last year, and on the 18th January this year she began running a series of trials with the view to deciding the best form of propellers. She was taken on official full-speed trials on the 2nd April, and, as above stated, completed all her tests about the 20th or 22nd June. She has thus been entirely completed in fifteen months from the laying of the keel, and represents a powerful addition to the fleet of ocean-going coal-burning destroyers of the British Navy. The duplicate vessels *Bulldog* and *Foxhound* have carried out their official trials and are now being completed. Mercantile vessels completed by the company during the

period include the twin-screw steamer *Zealandia*, which is described and illustrated elsewhere in the present issue. They have also recently put through successful speed trials the steam yacht *Doris*, which, as already noted, was launched by the same tide as the battleship *Colossus*. Messrs. Brown & Co., it may be stated, are at present building fine new administration offices at the main entrance to their establishment, and are about to erect extensive shedding accommodation for the building of the smaller class of vessels requiring protection from the weather, and for small boat construction, etc.

The Fairfield Shipbuilding and Engineering Co., Govan, who have booked, as already stated, an order for a large intermediate steamer for the Union-Castle Steamship Co.'s South-African service, have on hand the battleship-cruiser of the *Indefatigable* type, ordered in March for the Government of New Zealand. They have brought to the trial trip stage H.M. second-class protected cruiser *Glasgow*, which was launched last September. Other naval work consists of six destroyers for the Home Government (three of them launched), and two for Australia (one afloat and one to be sent out in sections). Important overhaul contracts which the company completed during the quarter under review consisted of the alterations to the *Royal Edward* and *Royal George*, formerly the *Cairo* and *Heliopolis* respectively, which have been altered and thoroughly equipped for the new service of the Canadian Northern Steamships, Ltd., between Avonmouth and Montreal. Both vessels, it will be recalled, were originally built by the Fairfield Company in 1907 for the Egyptian Mail Steamship Co.'s fast Mediterranean service, and were engaged in that service for some time before being sold to the Canadian concern. The Fairfield Company are at present having erected alongside their fitting-out basin a mammoth cantilever crane of 150 tons capacity, similar in its general features to the crane at the fitting-out basin of Messrs. John Brown & Co., Clydebank, and that at the basin of Messrs. Wm. Beardmore & Co., Dalmuir. Hitherto at Fairfield the heavy lifts in the fitting-out of naval and mercantile vessels have been handled by a set of powerful shear-legs on the other side of the dock; and while these will still be utilised, the new crane will very materially enhance the fitting-out equipment of the dock, especially as concerned with naval ships, as it will be greatly superior in facility and speed of operation.

Messrs. Wm. Beardmore & Co., Parkhead Forge and Steel Works, and Dalmuir Shipbuilding Works, have now entered upon a state of brisk prosperity after a prolonged period of dullness

which they, in common with other leading Clyde shipbuilding and steel-manufacturing firms, have suffered from. In almost every department Messrs. Beardmore have recently been successful in booking orders. At present they are among the private builders having the largest warship tonnage on hand. This includes the new battleship *Conqueror* and a cruiser of the "Town" class, in addition to the *Gloucester*, now practically ready for trials. They have besides in their forge and steel works secured good orders for material for warships building at other centres, and the later orders that have come in for guns further improve their position. Their gun factory at Parkhead is of recent creation, and gratification is felt at the fact that the firm have in their initial orders given such satisfaction as to lead to increased contracts. With a likelihood of a continuance of the boom in warship-building for years to come, the enterprise of this Clyde firm will not stop short of placing their shipbuilding, armour plate making, forge, gun-making, and gun-mounting establishments on a plane with the great naval construction works at Elswick and Barrow.

Messrs. Wm. Hamilton & Co., Port-Glasgow, whose works are in the same state of activity as has obtained for some considerable time, are progressing with the two large floating docks for Swedish port authorities, and have on hand five or six vessels all being built on the Isherwood longitudinal system. One of the vessels on this system recently launched is distinguished by features of novelty in her equipment. This is the *Jonathan Holt* for the fleet of West African trading vessels belonging to Messrs. John Holt and Co., Liverpool. The features referred to consist of special provision for the exclusion of mosquitos from the living and other quarters. All the skylights and air apertures have special coverings of closely worked copper gauze. The port-holes have double doors of ordinary glass for use in the temperate zone, and of copper gauze for replacing the glass when the tropical zone is reached. There are similar double doors in the saloons of the vessels and in the sleeping quarters of the men. Last year a similar mosquito-proof equipment was placed on a small steamer specially built for work on the Niger, and it has turned out a great success, reducing considerably the rate of mortality from disease. A recent contract placed with Messrs. Hamilton and Co. is that from the British Admiralty for eight floating pontoon targets, required in connection with the new torpedo-testing range at Loch Long. These pontoon targets will provide a considerable amount of work for their *employés*.

Turning now to the East Coast of Scotland, the

tonnage output of all three rivers—Forth, Tay and Dee—for the second quarter of this year is found to be an improvement on that of the first. The figures for April, May and June reach a total of 7,700 tons, *viz.*, 1,700 tons for the Forth, 4,000 tons for the Tay, and 2,000 tons for the Dee, made up of twenty-eight vessels mostly of small tonnage, a large proportion being steam drifters. The most important items were the s.s. *Royal Scot*, of about 2,000 tons, built and engined by the Caledon Shipbuilding and Engineering Co., Dundee, for the London and Edinburgh Shipping Co., Leith; the s.s. *Svetoi Spiridon*, of 1,500 tons, built by the Dundee Shipbuilding Co. for Russian owners; and the s.s. *Magdeburg*, of 775 tons, built by the Greenock and Grangemouth Dockyard Co., Grangemouth, for Messrs. James Currie & Co., Leith. In the latter case, however, the machinery, consisting of triple expansion engines of 1,000 H.P., was supplied by Messrs. Richardsons, Westgarth and Co., Middlesbrough. New orders placed during

the period include two steamers for the general passenger and cargo service of the Clyde Shipping Co., Glasgow, and a steamer about 300ft. in length for tourist traffic for foreign owners, to be built by the Caledon Shipbuilding and Engineering Co., Dundee; a steamer for the dead-meat trade from the River Plate for London owners, by the Greenock and Grangemouth Dockyard Co., Grangemouth; and a steamer of 600 tons for Liverpool owners, by Messrs. Mackay Brothers, Alloa.

The Aberdeen Harbour Board are having erected a new shear-leg crane of a lifting capacity of 100 tons at Victoria Dock, the cost of which will run to £6,500. The new shear-legs are necessitated through the fact that the existing set, which were erected 37 years ago, were seen to be unsuited both as regards lifting power and outreach for putting machinery on board the new steamer, noticed in last quarter's notes, which Messrs. Hall, Russell & Co. are building for Messrs. John T. Rennie & Son.

BELFAST.

Shipbuilding at both the great establishments at Belfast is at present brisk. During the quarter Messrs. Harland & Wolff have delivered the Union-Castle mail steamer *Edinburgh Castle*, over 13,000 gross tons, and launched the *Pakeha*, about 8,000 tons, for the New Zealand trade of the Shaw, Savill & Albion Company. At the time of writing it is expected that the latter vessel will run her trials on the 8th July. The following vessels are on the stocks:—the White Star liners *Olympic* and *Titanic*, about 45,000 tons each; a first-class mail steamer for the P. & O. Company; the Bibby liner *Gloucestershire*, about 8,000 tons, to be launched on the 7th July; and two steamers, each about 12,000 tons, for the Aberdeen White Star Line, to be named the *Themistocles* and *Demosthenes* respectively, the former to be launched in September. The second vessel, the *Demosthenes*, is to be propelled by a combination of reciprocating and turbine engines, and is to take the place of the *Pericles*, wrecked on the Australian coast some months ago. In addition, the firm have in hand the new Hamburg-Amerika liner and an intermediate ship for the Union-Castle Line. During the quarter they have repaired the Imperial Direct West Indian Company's steamer *Port Henderson*. The Atlantic liner *Minnehaha*, after being ashore on the Scilly Islands, was expected to come here for repairs, but she was sent to Southampton.

The progress made with the construction of

the great White Star liners *Olympic* and *Titanic* is, of course, the chief shipbuilding topic of conversation in the Ulster capital. With the advanced condition of the shell of the *Olympic*, which is now partly painted, the hydraulic riveting is coming into prominence. All the ironwork is completed up to the shelter deck—the highest continuous deck in the ship—and the bridge deck plating and riveting are well advanced. Over 1,000 sidelights are already fitted. The erection of the stateroom framing on some of the decks is well advanced, and the fittings are being pushed forward in the shops, while the second and third-class stairways are completed up to the shelter deck. The internal work is proceeding in connection with the fitting of sanitary and air pipes, tank suction, watertight doors, etc. The fixed launching ways are fitted all fore and aft under the ship, and the builders have commenced to put the sliding ways in position. The vessel, it is expected, will be put into the water in October, and the launching weight will easily exceed that of any vessel previously launched. The construction of the turbo-reciprocating machinery for the *Olympic* is keeping pace with that of the hull. The principal parts of the engines are well forward, the crankshafts turned, most of the columns erected, cylinders bored and drilled, thrust-shafts turned, turbine shafting finished, and turbine castings made. A large number of the

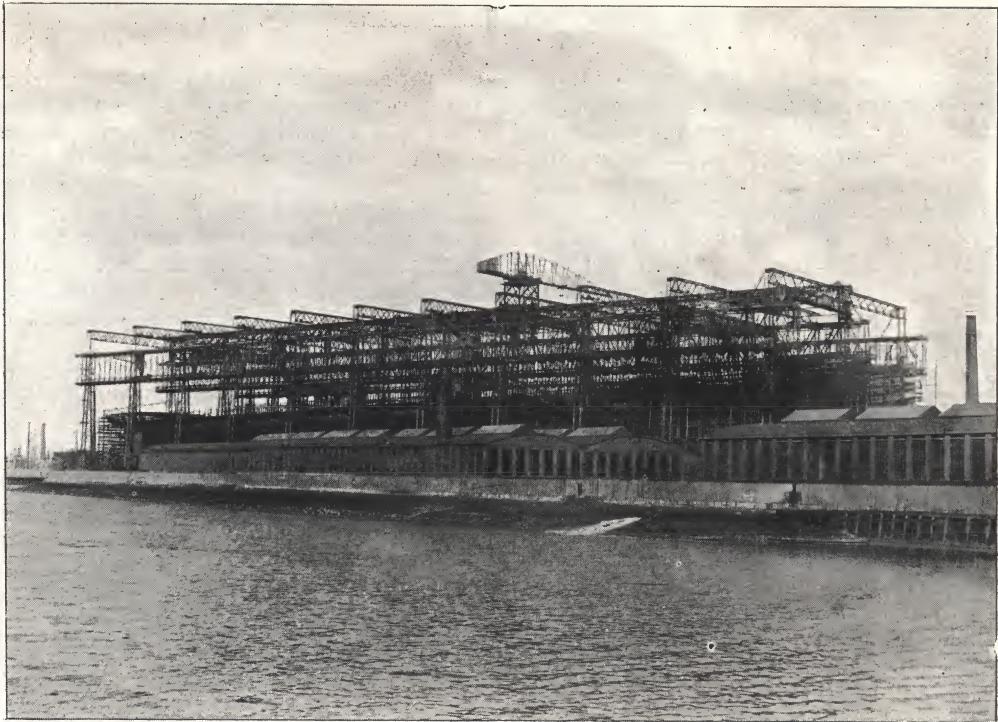


Fig. 1.—The Berths on which the "Olympic" and "Titanic" are building, showing Electric Overhead Crane Equipment.

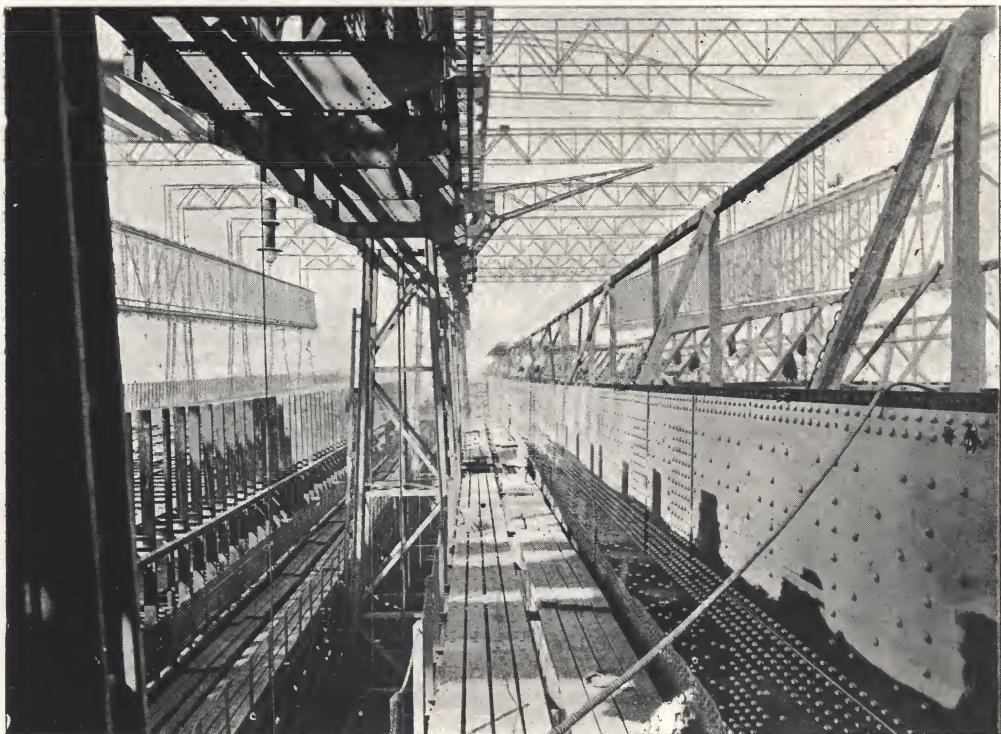


Fig. 2.—Framing and Plating of "Titanic," and Plating and Hydraulic Riveting of "Olympic."



Fig. 3.—First-class Dining Saloon of the "Olympic."
(Photographed 6th June.)



Fig. 4.—View under the Bottom of the "Olympic."

boilers have been water-tested, and work has been commenced on one of the funnels, of which there will be four in the vessel. Turning to the *Titanic*, which is not so far advanced as her sister, we observe that the shell plating, deck plating, etc., are well advanced. She is expected to take the

senger and cargo steamer *St. Albans*, of 4,500 tons, for the Eastern and Australian Steamship Company, London; and the Brazilian Lloyd liner *Minas Geraes*, the last of the eight vessels constructed at Belfast for the South American company. The firm are now building two-

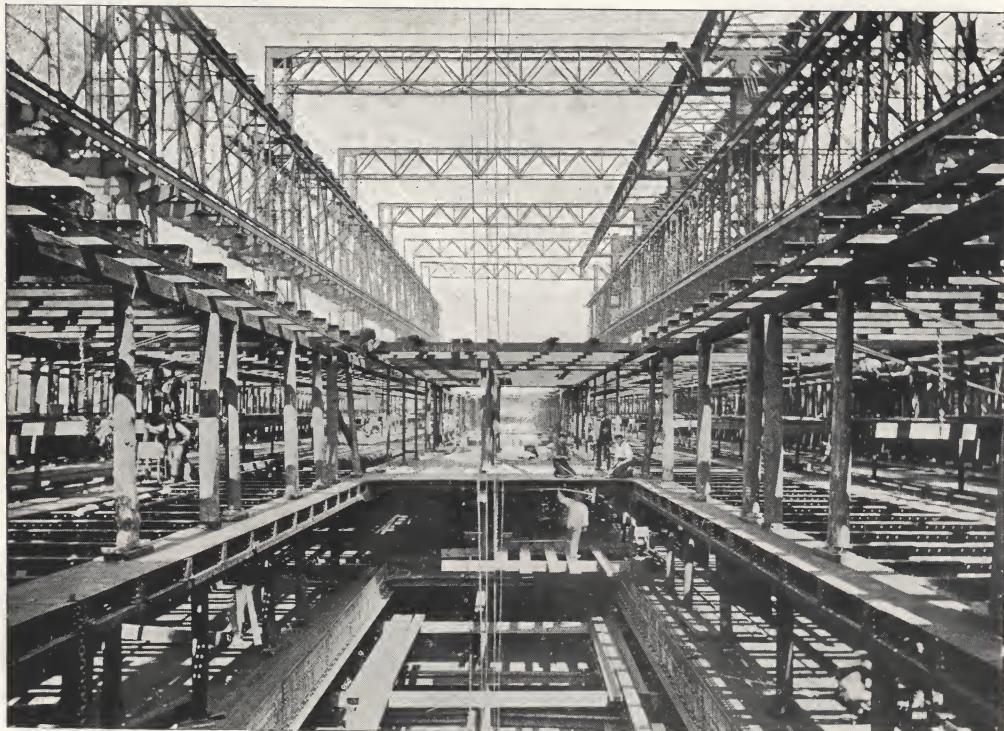


Fig. 5.—“Titanic” Saloon Deck, looking aft.
(Photographed 6th June.)

water in March next. The two vessels are at present giving employment to about 6,000 men, about one-sixth of whom are on nightshift.

During the quarter Messrs. Workman, Clark and Co. have launched or delivered the Tyser liner *Muritai*, over 7,000 gross tons; the pas-

steamer of 10,000 tons for the Holt Line, of Liverpool; a vessel for Messrs. Lampart & Holt, Liverpool; a steamer for the Houlder Line, London; a fruit boat of 4,160 tons for Messrs. Elders & Fyffes, to be delivered in February; and several other vessels.

THE TYNE.

The Tyne's share of the contracts for the twenty torpedo-boat destroyers so far placed by the British Admiralty in connection with the 1910-11 programme is practically of the same value as it was last year. Of the six special vessels, two have been allotted to the Parsons

Marine Steam Turbine Company, Wallsend, and as this company confine their attention to propelling machinery the hulls will be constructed by Messrs. William Denny & Brothers, Dumbarton. The other four boats have been divided between Messrs. John I. Thornycroft and Co.,

Southampton, and Messrs. Yarrow & Co., Scots-toun, each receiving contracts for two. Three of the fourteen destroyers of the standard type have been secured by Tyne firms, two by Messrs. R. & W. Hawthorn, Leslie & Co., Hebburn, and one by Messrs. Swan, Hunter, and Wigham Richardson, Wallsend, the turbines for the latter vessel being supplied by the Wallsend Slipway and Engineering Co. The remaining eleven standard boats have been placed as follows:—two with Messrs. J. Samuel White & Co., East Cowes, two with Messrs. Cammell, Laird & Co., Birkenhead, one with Messrs. Vickers, Sons and Maxim, Barrow, and six with Clyde firms, as detailed in our notes from the Scottish shipbuilding centres. Last year, it may be recalled, the Tyne's share of the destroyer contracts was four vessels, three given to Messrs. R. and W. Hawthorn, Leslie & Co. and one to Messrs. Swan, Hunter, and Wigham Richardson.

Still another Admiralty contract has been secured by a Tyne firm during the past few weeks, Messrs. R. & W. Hawthorn, Leslie & Co. having been entrusted to construct at their St. Peter's Works the turbine engines, of 18,000 I.H.P., for the first of the three unarmoured cruisers to be built under the current year's estimates, two at Pembroke and one at Chatham. This machinery will be similar to that built at the St. Peter's Works for the cruiser *Blanche*.

As regards contracts for foreign war vessels, an order for a battleship for Chile was reported to have been definitely secured by Sir W. G. Armstrong, Whitworth & Co., Elswick, a week or two ago. The report occasioned no surprise in naval shipbuilding circles, as it was fairly well known that the company had been conducting negotiations with Chile for some considerable time. Apparently, however, the announcement was premature, for according to later cable advices from Santiago de Chile the Minister of Marine stated the report that a contract had been signed was incorrect. The present position, it would seem, is that the Chilian Senate has approved the original programme, and the Naval Commission in London has been instructed to ask for tenders, to be opened on the 15th August, for a battleship of 20,000 tons displacement, four ocean-going destroyers, and two submarines. It is known that American builders are competing for this work; but, notwithstanding their success in the case of the Argentine contracts, there is good reason for hope that the armoured vessel will eventually be built on the Tyne, and it is probable that the propelling machinery will be supplied by Messrs. Vickers, Sons & Maxim, Barrow, as in the case of the Brazilian battleships.

The 33-knot ocean-going destroyer *Viking*, built and engined by Palmers Shipbuilding and

Iron Company, Jarrow, ran her acceptance trial on the 30th June, and left for Chatham. The *Viking* is the last to be delivered of the twelve "Tribal" destroyers, of which Tyne builders have been responsible for four, viz., the *Zulu* and *Ghurka* (built by Messrs. Hawthorn, Leslie and Co.), the *Afridi* (built by Sir W. G. Armstrong, Whitworth & Co. and engined by the Parsons Marine Steam Turbine Co.), and the *Viking*. At the time of writing, the British second-class protected cruiser *Newcastle* (built by the Armstrong Company and engined by the Wallsend Slipway & Engineering Co.) is undergoing her final speed trials.

Turning now to mercantile work, it may be observed that the orders booked during the period under review show a falling off as compared with those secured during the first three months of this year. They include a 600-ft. intermediate liner for the Cunard Steamship Company, similar to the *Franconia*, by Messrs. Swan, Hunter, & Wigham Richardson; a liner for the British India Steam Navigation Co. and a cargo steamer for Messrs. Hoffmann, Budapest, by Palmers Shipbuilding & Iron Co.; and a 9,000-ton D.W. steamer capable of a speed of 12 knots for Messrs. Thos. Wilson, Sons & Co., Hull, by the Northumberland Shipbuilding Co., Howdon, with engines by Palmers Company. The last-named vessel will be similar to one ordered by the same owners from the Northumberland Company early this year.

The launch of the *Franconia*, the first of the two intermediate Atlantic liners which Messrs. Swan, Hunter, and Wigham Richardson are building at the Wallsend Shipyard for the Cunard Steamship Company, has been fixed to take place on Saturday, 23rd July. The vessel has been built on the covered berth from which the *Mauretania* was launched, and the keel of the sister ship to the *Franconia*, referred to above, will be laid on the same berth immediately after the forthcoming launch.

The inauguration of the new rooms of the North-East Coast Institution of Engineers and Shipbuilders, at the Bolbec Hall, Newcastle, took place on the 23rd May. The institution has secured a lease of the whole of the third floor, comprising a council room, library, committee and smoking room, secretary's office, and assistant secretary's office. The rooms were formally opened by Mr. William Boyd (of the Wallsend Slipway & Engineering Company), who was the first president of the institution. The inauguration of the new premises was also made the opportunity to present Mr. Boyd with a marble bust of himself, which had been subscribed for by the members of the institution.

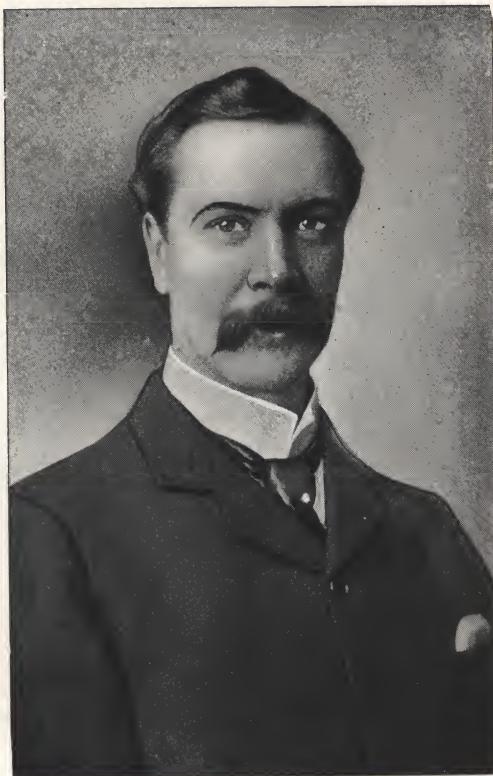
THE SHIPBUILDER.

THE WEAR.

During the three months ending 30th June, a total of nineteen vessels, representing 56,578 tons, have been launched by Wear shipbuilders, as compared with seventeen vessels of 40,825 tons during the first three months of 1910. The total for the first half of this year—thirty-six ships of 97,403 tons—is the highest for any first half-year since 1907, the totals for the first six months of the last nine years being as follows:—

Year.	Ships.	Tonnage.
1902	30	106,823
1903	27	87,438
1904	33	94,331
1905	40	131,879
1906	44	137,009
1907	48	154,359
1908	15	32,365
1909	29	61,192
1910	36	97,403

As regards new contracts received by Wear shipbuilders during the past three months, the following are the principal bookings:—Messrs. William Doxford & Sons, a single-deck steamer of 7,400 tons D.W. for Messrs. Farrar, Groves and Co., London, and a vessel of similar carrying capacity for the Societa Anonima di Navigazione Lussino, Lussinpiccolo, Austria; Messrs. Short Brothers, a 6,500 D.W. steamer for the Taylor and Sanderson Steamship Co., Sunderland, with engines by Messrs. George Clark, Limited; the Sunderland Shipbuilding Co., a 6,000 D.W. steamer for Messrs. Hall Brothers, Newcastle, with propelling machinery by the North Eastern Marine Engineering Co., Sunderland; and Messrs. John Priestman & Co., two cargo steamers each of 5,600 tons D.W. for Messrs. Pardoe-Thomas and Co., London and Newport, with engines by Messrs. George Clark, Limited.



The Late Mr. George Bartram.

The death took place on the 1st May, at Sunderland, of Mr. George Bartram, the eldest son of Mr. R. A. Bartram, head of the shipbuilding firm of Bartram & Sons, Sunderland. Up to recently the deceased, who was forty-nine years of age, enjoyed robust health, but about three months prior to his death he was taken ill with an internal complaint, which proved fatal. Mr. Bartram served his apprenticeship at his father's shipbuilding yard. After becoming acquainted with the various branches of the business, he went to the Clyde to gain further experience in one of the yards there, and on his return he resumed his association with the firm with which his family is identified, and of which he has for some years been one of the principals. Mr. Bartram was a member of the Sunderland Town Council, having been first elected in 1902. He took a great interest in the cause of technical and higher education, and was convener of the governors of the Sunderland Technical College. He also identified himself with the religious life of his native town, being one of the elders of St. George's Presbyterian Church and acting as treasurer. As a member of the Sunderland Shipbuilders' Association, he was well known in local ship-

building and marine engineering circles, his extreme amiability making him popular with all who came into contact with him. His death in the prime of life evoked much sympathy with his family and the shipbuilding firm in their loss.

TEES AND HARTLEPOOL.

During the past quarter shipbuilders and marine engineers in this district have been fairly busy, and the amount of new tonnage placed will keep the yards moderately active for a few months, although none are yet employed at their full capacity. Enquiries for new vessels at the time of writing are not so numerous as they have been, most of those occupying attention being for large single-deck steamers.

At Middlesbrough Sir Raylton Dixon & Co. have been successful in securing two steamers of about 7,000 tons D.W. for Messrs. Brunsgaard, of Drammen, the engines for which will be supplied by the North Eastern Marine Engineering Co., Sunderland. The same builders have also booked two vessels of 6,500 tons D.W. for the Atlantica (Hungarian) Steamship Co., to be employed chiefly in the Black Sea grain trade. This work, together with the two vessels to carry passengers and a cargo of about 8,500 tons D.W. for New York owners, to which we made reference in our last notes, is very encouraging. Smith's Dock Company are fairly busy with new work, turning out trawlers and other small craft very quickly. Among other contracts, they have secured one for three small vessels about 150ft. long for Bristol Channel owners.

At Stockton, Messrs. Ropner & Sons have only two large vessels under construction. Messrs. Richardson, Duck & Co. are moderately well employed, having three vessels in hand, one of which is building on the Isherwood system of longitudinal framing. They have recently

secured contracts for two vessels from the Atlantica (Hungarian) Steamship Company, and one of 7,500 tons D.W. for Messrs. W. J. Tatem and Co., Cardiff, with engines by Messrs. Blair and Co. Messrs. Craig, Taylor and Co. have three steamers on the stocks and two fitting out afloat. Three new orders for single-deck steamers have come their way during the past quarter, *viz.*, one about 392ft. long for the Clapham Steamship Company, Newcastle, with engines by Messrs. MacColl & Pollock, Sunderland (this vessel is now under construction); a steamer about 365ft. long for Messrs. Seager, of Cardiff, with propelling machinery by the North Eastern Marine Engineering Co., Sunderland; and a vessel of about 7,500 tons D.W. for Messrs. W. J. Tatem and Co., Cardiff, and in this case also the engines are being supplied by the North Eastern Company.

At Hartlepool, employment in the various yards continues fairly plentiful. Messrs. William Gray & Co. have received contracts for two vessels each of about 9,000 tons D.W. for Messrs. Kuhlne & Christensen, of Bergen, intended for the Pacific trade, and a steamer of about 7,000 tons D.W. for Messrs. A. P. Ohlsen and Co., Hartlepool. Irvine's Shipbuilding & Dry Docks Co. have recently booked a steamer about 450ft. long for Messrs. Cayzer, Irvine & Co. of the Clan Line, and another vessel with a deadweight capacity of about 8,200 tons, the engines for both of which will be supplied by Messrs. Richardson, Westgarth & Co., Hartlepool.

BARROW-IN-FURNESS.

The success which has attended the trials of the Brazilian battleship *São Paulo* and the British second-class protected cruiser *Liverpool* and the launching of the Brazilian floating dock, all of which are dealt with elsewhere in the present issue, tend to bring the name of Messrs. Vickers, Sons & Maxim prominently to the fore at a time when several important contracts are likely to be placed by the British and foreign governments. The *Liverpool's* performance is nothing short of brilliant; and although more than one of the "Town" cruisers have partly completed their trials, the results so far attained have not equalled those of the *Liverpool*, and other builders are faced with no mean task if they wish

to improve on the record of the Barrow-built vessel.

The Barrow yard is now working at full pressure, and in the engineering department an enormous volume of work is in hand, including the 70,000 H.P. turbines of the battleship-cruiser *Lion* as well as those for the sister ship building here. The contracts now being carried out by the company are as varied as they are extensive, and comprise, in addition to British and foreign shipbuilding, British and foreign guns and gun-mountings, British submarines of a new design, and an airship possessing many new features. Although so fully occupied at home, developments in the Colonies are not being neglected, the

latest reports from Canada indicating that the Vickers Company are about to put down an extensive shipbuilding and repairing yard at Montreal in order to deal with Canadian orders for war and merchant ships.

On one of the slips lately occupied by the Brazilian floating dock the Chinese cruiser is to be laid down. Little is known at present regarding this vessel, but it is understood that she will be more of a protected cruiser of our *Boadicea* type than anything else. Locally the hope is entertained that this vessel will be the forerunner of others, as it is known that the Chinese Government contemplate the making of several additions to their navy.

The order from the British Government for

one of the 27-knot ocean-going destroyers covered by the 1910-11 estimates is the latest addition to the contracts secured by the Vickers Company. Reports are also circulating that the company are to share the Chilian as well as the Turkish orders despite the competition of the American builders. Whatever negotiations have been going on, some time must necessarily elapse before anything of a definite nature regarding the Turkish or Chilian contracts will be known. The Vickers and the Armstrong companies are certainly in a strong position, but the financial side of these negotiations invariably occupies much time before the actual construction of the vessels can be proceeded with.

THE MERSEY.

Ship-repairing, rather than shipbuilding, has been fairly active on the Mersey since the publication of our last notes, though in the famous shipyards of Messrs. Cammell, Laird & Co. more new work has been accomplished than has been the case for a long time. The three British torpedo-boat destroyers of the 1908-9 programme are now practically complete. The *Renard* first went North for her speed trials on the Clyde, followed by the *Wolverine* and later by the *Racoon*. These craft are fully up to the standard of the Mersey yard, and that their construction has given satisfaction is proved by the fact that the firm have been allotted two of the destroyers of the 1910-11 programme. The four destroyers in hand for the Argentine Government are progressing apace; and other work is also being pushed forward, particularly the big floating dock for the British Government and a number of lighters for South American and West African waters. A number of vessels have been through the Birkenhead dock of Messrs. Cammell, Laird and Co. for repairs and overhaul, and though there is still room for more, the volume of work done is satisfactory.

The Mersey Engine Works, under Mr. J. B. Wilkie, continue among the busiest in the port. The engines for small steamers occupy considerable attention and keep one section of the shops busy. The repairs department is also kept hard at work on the huge Elder-Dempster fleet and with general repairs to other shipping, while the construction of launches for West Africa and elsewhere keeps the large premises devoted to

building in constant activity. Messrs. H. & C. Grayson have been well employed in the general repair, overhaul and docking of vessels entering the port, and of this work Messrs. Clover, Clayton and Co. and Messrs. David Rollo & Son have also had their share. The value of Liverpool's large graving docks was demonstrated a few weeks ago by the arrival from Barrow of the Brazilian battleship *São Paulo*, one of the largest battleships afloat, for the purpose of dry docking prior to running her trials.

Liverpool engineers have contributed many valuable improvements in ship fittings, and now Messrs. H. D. Morgan & Co., of this city, have introduced a new mushroom-shaped cowl ventilator that should appeal to owners desirous of supplying fresh air direct into staterooms. The great advantage of this design is that it is always "trimmed" to the wind and acts as a combined intake and extractor. It consists of a cylindrical body, in which are four guide vanes. Air is admitted at whichever side the wind strikes, and passes below through the section or sections formed by the guides. The sections on the lee side of the ventilator act for suction purposes, and consequently a constant circulation is set up. The dome top is fitted with a threaded spindle, and can be raised or lowered at will from above or below. When screwed down the ventilator is perfectly watertight. As the result of an efficiency test, a good sized hall was absolutely cleared of dense smoke in a very short time by one of these ventilators.

THE ROYAL DOCKYARDS.

From our own
Correspondents.

PORSCMOUTH.

Work during the past quarter at Portsmouth has been of a very humdrum character. A number of ships have had moderate re-fits for the grand manœuvres and the harbour is now quite depleted, all the Third and Fourth Division vessels having been mobilized to full complement with officers and men from the shore establishments and proceeded to sea.

The battleship *Orion* is still on the slip, jealously guarded from the eye of the casual passer-by, and the launch is to take place on the 20th August. The progress made has been quite satisfactory. The plating has been carried up to the upper deck, the stem and stern castings are *in situ*, and one is able to form an idea of what a bulky vessel she will be. She is quite the largest vessel built here. From stem to stern she is 545ft., and of 88ft. beam. Her displacement will be 22,500, and I.H.P. 27,000. The machinery will be Parsons turbines, manufactured by the Wallsend Slipway and Engineering Co., steam being provided from eighteen water-tube boilers when at full speed. A novelty in the *Orion* will be a new armour plate, to be used on the sides and barbettes, of less thickness than those on the *Dreadnought*, but of increased power of resistance. The barbettes, as will be seen from the article on "Battleship Design" in the present issue, are all to be placed in the middle line. The speed will be that of the *Dreadnought*, *viz.*, 21 knots, to secure fleet homogeneity. There will be only one mast, the usual tripod, but the one or two fire-control towers will be armoured.

The *Neptune*, laid down in January of last year and launched in September, is far advanced. Her masts are in, funnels up, barbette guns in

place, and most of her barbette armour built up, while in addition to the main engines a number of auxiliaries are well advanced. It is expected that the *Neptune* will go on her trials in the late autumn, and be ready for sea at the opening of the year.

The cruiser *Good Hope* has just completed a general re-fit, which has included the addition of magazine-cooling apparatus and an improved wireless installation. The *Albermarle* and the *Prince George* have also passed through Dockyard hands, and a number of Home Fleet cruisers.

After the launch of the *Orion* there is reason to believe that the slip will be unoccupied for some months, and that the new battleships provided for in the Estimates will not be laid down until December or January, so little money having been allocated for the purpose.

The personnel of the Yard, not including the works department, is still 10,000, and there is no likelihood of a reduction while so much work is allocated here. The re-opening of the establishment, for which 150-200 men are eligible, has given great satisfaction.

An interesting link with the past is disappearing. With the loss of the *Marlborough*, only one of the old three-deckers—the much more famous *Victory*—remains afloat here. The *Marlborough* has been detached from the floating torpedo school and taken into the basin to be denuded of her fittings preparatory to sale out of the service. In her day she was a first-class steam three-decker of 131 guns. She was unlucky enough to stick half-way down the slip when launched and was not got off until midnight.

DEVONPORT.

The launch of the *Lion*, the world's largest cruiser, has been fixed provisionally for the 6th August, the tide suiting best for a launch early in August. At the middle of June she had been advanced to within three-quarters of her launching weight and her frames were in position up to the upper deck. The protective deck is arched over the engine and boiler rooms to give accommodation for the propelling machinery of 70,000 H.P., which is a vast advance upon the 45,000 H.P. of the previous *Dreadnought*-cruiser on the slip, the *Indefatigable*, now completing in the Prince of Wales basin. In spite of an increase in the freeboard and beam and more extensive armour protection, the *Lion* has suffered no loss of grace in her lines, which are in keeping with modern British cruiser practice. The "A" brackets have come to hand and weigh 30 tons each. The internal diameter of the shaft bearing cylinder is over two feet, and no such brackets have been seen in the Yard before.

The *Indefatigable* will be ready for the pennant early in the new year. The entire big-gun equipment has been received from the makers and the main turbines have been placed in position, while the superstructure to carry the 4-in. anti-torpedo armament is well advanced and the conning towers complete. A million sterling is being spent on the *Lion* and half-a-million on the *Indefatigable* this financial year. The latter is to carry the latest Mark X. and Mark XI. type of 12-inch ordnance, each gun weighing over 60 tons. The conning towers have no doors and are entered from below. The ship has three funnels, and the foremost (the largest) has been lengthened ten feet to give the smoke a clear run over the navigating bridge.

The re-fit of the *Europa* has cost £20,000. She has been modernised in many directions. Her fire-control and electric-power circuits have been examined and modern fittings added where needful; while her dynamos have been replaced by a more powerful pattern and her low power "wireless" substituted for plant of medium power. The *Europa* has always had a reputation as a voracious coal eater, and here, too, great changes have been made.

The *Pelorus* has been re-fitted at a cost of over

£20,000, and the *Espiegle* and *Sutlej* have also been in Dockyard hands.

Of late several important improvements have been made in the Yard plant. At the extreme end of the South Yard it has been found more economical to build a sub-generating electrical station, which supplies the building slip on which lies the *Lion*, and the surrounding workshops. The elaborate telephone system has also been placed under the control of the electrical department. The cumbersome and slow system of supplying oil to ships in 25-gallon drums has been replaced by a method of quick transit in 1,500-gallon cylinders, painted a different colour for each variety of oil, which are mounted on railway trucks, taken to the dock side, and the contents conveyed aboard by means of hose. A large smithery is also being built near the building slip, the factory in the North Yard being unequal to the increasing work of the Yard and too distant from the slip; and instead of the smithery being constructed at right angles to the main line of rails, the American system has been adopted of running the main line right through the shop.

The re-opening of the establishment has given great satisfaction here, it having been closed since 1906. Sixteen hundred men are to be kept on the list (20 per cent. of the personnel, the works department excluded). This is a reduction of 300. The King's birthday holiday was blundered here as elsewhere. It was only announced on the day before it took place, and the cashier's department did a smart thing in putting up the pay for 10,000 men in an hour, which was all the notice the department had. The men were paid, as usual, as they left. About an hour later the order was cancelled, but the officers decided that nothing could be done, and the Yard remained closed. At Portsmouth the original order came so late that it was ignored, and consequently the men had a "proper" holiday on the re-appointed day, the 24th June, while at Devonport the Yard opened as usual. The whole affair was an extraordinary bungle, and as nothing has been said about it in Parliament it is probable that a more serene authority than "My Lords" vacillated.

CHATHAM.

The construction of submarines is being continued, and with a success that emulates Barrow, the first home of the British submarine, "C. 44," the last of the class, has been launched by the

daughter of the Admiral-Superintendent, and was subsequently docked for completion. The building of engines goes on concurrently with the construction of the hull, and there is little delay in

completing for sea. The "D" class submarines will now be built here. The one which has arrived at Portsmouth is much bigger than the "C" class and has two periscopes. "C. 33" has a length of 135ft., a breadth of 13ft. 6in., and a displacement of 321 tons when submerged. Her engines, of 600 H.P., give her a surface speed of 13 knots.

Among the vessels that have re-fitted here are the battleship *Dominion*, the scout *Sentinel*, the cruiser *Inflexible*, and the battleship *Irresistible*; while the Pembroke-built *Boadicea*, the first of the improved scout class, has been here to re-fit. The *Agamemnon* has also been in hand for a slight re-fit.

While the long-deferred announcement that the establishment would be re-opened has given general pleasure, yet the news that the percentage of workmen to be established will be less than in the past has caused much misgiving. Though by becoming established they receive less wages the loss is more than recouped financially by superannuation at sixty (the retiring age of all workmen), death benefit and a retiring bonus, and industrially by being guaranteed constant employment subject to good behaviour and competence.

The King's Birthday holiday, the most popular holiday of the year in Naval and Dockyard establishments, at all the Yards this year savoured of rich comedy, and was a grotesque example of bungling by someone in authority, probably not at the Admiralty. Someone suddenly decided on the afternoon of the 2nd June that it should be observed the following day (a Friday), and as the men left the Yard the police shouted out the information, which came as a total surprise, and was not welcome because the holiday has always been a great "outing" day by road and rail. In the evening, when it was found that some of the other yards were not following suit, the order was countermanded by announcements in the theatres, music halls, etc., and telegrams sent to subordinate officials. From the general point of view it is interesting to note that this casual means of informing the Dockyard men was so successful that only 273 absented themselves from work on the Friday, though many of the men live three or four miles away from the Yard. It proves that in times of emergency the Yard could be quickly mobilized. After a fortnight's notice the holiday was kept on the 24th June, and the 273 men will have to work up their lost time.

SHEERNESS.

In preparation for the manœuvres a number of torpedo craft have passed through Dockyard hands. These include ten destroyers of the first flotilla, and also five submarines, which are now no longer treated as mysterious vessels, but repaired by the more skilled of the ordinary Dockyard civilian staff. The destroyer *Swift* would have been re-fitted here, but she is of a special type, of abnormal length, and had to go to Chatham. The sum of £18,000 is being spent on the torpedo gunboat *Harrier* as an instructional boat for the training of officers in navigation. Two destroyer boilers are to be fitted aboard in substitution of those at present in her.

Sheerness Harbour bar has now been dredged from 19 to 20 feet to 25 feet at low water of spring tides. The undertaking which has been carried out had long been talked about, but it was opposed by the Admiralty because it was believed that the bar would too speedily silt up again. Dredgings for the purpose of investigation were made and the bar found to consist merely of shell with a little sand mixed. It is believed that the accretion was due to shell fish alone and not to tidal action, and now that a 25-ft. channel l.w.s.t. has been made it is hoped that the channel will scour itself.

PEMBROKE.

Pembroke is apparently being specialised by the Admiralty in the construction of one type of ship, *viz.*, a fast unarmoured cruiser able to lead destroyer divisions and carry the broad pennant of the Commodore, and the experiment has had an interesting result. The name ship, the *Boadicea*, took twenty-four months to build, the *Bellona* was built in four months less, and it

is probable that on the *Blanche* and the *Blonde*, now under construction, time will also be saved.

The next ships are to be named the *Barrosa* and the *Barracouta*, the previous vessels bearing these names being sister ships of the old *Blanche* and the old *Blonde*, both of which were built at this Yard. The new vessels are to be 385ft. long and identical in every respect with the

earlier vessels, with one conspicuous and novel exception. The first of the new ships is to have a clipper bow. This is quite an experiment and the object aimed at is to prevent the big seas from sweeping the forecastle. At the same time the below-water ram is to be retained, and presumably when it comes to be used in grim earnest those aboard will have to be prepared for a smashing-up of the clipper stem. It had been intended to try the experiment upon the *Blonde*, but she was then too far advanced.

The *Blanche* was at the end of June ready for her steam trials. The launch of the *Blonde* was delayed a fortnight to enable the contractors to complete the boring of the propeller-shafting.

The old destroyer *Antelope* has completed her re-fit, and it is hoped that the repair of the engines has been sufficiently satisfactory for her to develop three-fourths of her original horse-

power of 3,500, and give her 16-17 knots speed, as against her original speed of $19\frac{1}{4}$ knots.

The Yard was very successful with its re-fits of the *Osprey*, *Violet*, and *Sylvia*. These destroyers have done exceedingly well in developing on trial 90 per cent. of their 6,000 H.P., which is very creditable for a re-fit. The *Sylvia* worked up to a speed of $28\frac{3}{4}$ knots, but the conditions prevailing below were spoken of as extremely trying.

The success of the Yard in re-fitting destroyers is doubtless partially responsible for the decision of the Admiralty to provide patent slips for destroyers. The works will extend 500ft. outwards into the Haven, and as most of the operations will be under water the slips are to be built by contract. It is significant that the graving dock, which will just accommodate vessels of the *Boadicea* class, is to be extended 50ft.

HAULBOWLINE.

The re-fits of the destroyers *Sirius* and *Gossamer* are in hand. Extra boilermakers and labourers have been entered for work on the

boilers of the latter. The re-fits are of a very extensive nature and will last six months. The work of dock extension is proceeding satisfactorily.

Automatic Bunkering of Ships.

EVERYONE acquainted with the rapid advances made in all branches of shipping on the Mersey in recent years, in respect of dock accommodation, dock equipment, and every other means that will aid the rapid handling of cargo, will be familiar with the innovation introduced some few years ago by Mr. P. B. Clarke, the inventor of the Clarke's patent automatic coaling barges for the automatic bunkering of ships. The old method of coaling ships, whether by hand or tip, was admittedly very much out of date, and, moreover, too tedious and expensive a process to be retained if a better could be found. Experience has already shown that the Clarke's patent automatic coaling barge can bunker any class of steamer, not only at a very much cheaper rate than by any other process, but also at a great saving of time. The principal steamship lines on the Mersey have been persuaded of their utility and economy, and in the near future there can be no doubt that the system will be adopted at the principal centres of shipping, both at home and on the Continent.

Clarke's coaling barges have a false bottom,

between which and the keel bottom is a space through which runs a continuous chain of buckets. Sliding doors are fitted in the false bottom, and the coal passes through these into the buckets, which are trimmed by an automatic arrangement. The buckets discharge into a self-acting and self-registering weighing machine, and the coal, after being weighed, passes into adjustable chutes, which lead into the deck bunker hatches, or the side coaling ports of the ship, as the case may be. The barge is operated with ease and rapidity, and, not being encumbered with working parts, is not liable to get out of order. Apart from the engineer and the deck hands (from four to six men in all) one man can completely regulate all actual coaling operations. The speed at which coal can be put into the bunkers of a ship by this system is from 100 to 150 tons an hour for each barge; and as coaling operations can proceed on both sides of the ship at the same time, even the largest liner can be coaled in a single night. Rapid and economical bunkering is not the only point that has been established by the Clarke's system. Ships can take in their supply of coal without any dust escaping into the air, thus

saving the heavy cost of cleaning ship and possibly re-painting, not to mention the greater comfort to passengers. Ships can also be bunkered wherever they may be berthed or moored, whether in dock, river or roadstead, and by day or night with equal facility, without interference with the handling of cargo.

These coaling barges, it is also important to note, have, besides the advantages before enumerated, the capacity for the mixing of coal in any given percentage to the particular standard that may be required. This process also is the invention of Mr. Clarke, and the results already achieved have effected a complete revolution in

To obviate any possibility of congestion or delay, such as prevails in connection with the ordinary dock coaling wharves or tips, Mr. Clarke proposes erecting at the principal ports his patent coaling and mixing bins, two of which are now being provided at Liverpool, one on each side of the Mersey. These bins have great capacity and are connected with the main railway systems. They are capable of discharging 1,200 tons of coal into each barge in thirty minutes, as compared with 12 hours to discharge a similar quantity from the ordinary dock tips. These bins are filled by another invention of Mr. Clarke, *viz.*, hopper-bottomed coal waggons.



Clarke's Patent Automatic Coaling Barges bunkering the Cunard Liner "Carmania."

the views of many shipowners as to the value of mixed coals. It can now be asserted that, by means of these barges, coals of varying qualities can be thoroughly mixed, and in such a way as to produce greater calorific power than from any available single coal. This latter advantage has already meant a great saving to shipowners. Since these coaling barges were first introduced at the Mersey port, they have been working up to the fullest expectations. Steamship companies employing them include the Cunard, White Star, Allan, American, Houlder, China Mutual, Leyland, Dominion, Nelson, Federal, Shire and Holt Lines.

with bottom doors, so that no tipping is required to discharge the contents into the bins. These waggons are equipped with air brakes, and it is claimed that the locomotives now in use for ordinary coal traffic can draw these waggons containing 100 per cent. more coal at a rate of speed equal to passenger trains. The long delays, the expense, and the anxiety often experienced in bunkering ships in congested docks may be said to have been overcome by the system of coal-handling now operated by the Liverpool Barge and Coaling Company under the direction of Mr. P. B. Clarke.

Systems for Burning Liquid Fuel.

THE use of liquid fuel for both marine and land boilers offers many advantages which are being more clearly recognised every day, and the various systems which have been devised for oil-burning are worthy of the attention of all engineers. One of the pioneer firms who have devoted attention to the subject, Messrs. Kermode, of Liverpool, have developed three systems to meet different conditions of service. The first, which is termed the "air jet" system, has been in successful operation at sea for the past seven years. It is claimed that with this arrangement from 83 to 84 per cent. of the calorific value of the oil fuel has been recovered under actual working conditions in an installation to three 500 H.P. Babcock and Wilcox

boilers at the Linacre Works of the Liverpool Gaslight Co. The working of an air jet burner will be understood from Fig. 2. The oil enters the burner at A, whence its flow is regulated by a conical valve placed on the spindle D and operated by the hand wheel E. The air is heated in a suitable apparatus by the waste gases from the boiler and then enters the burner through the branches B and C. The air entering through C meets the oil at the conical control valve, and the oil and air travel on together round a helix (K) placed in the central tube, the oil being vaporized and completely mixed with the air during the passage. The air supply can be regulated at two points by means of the pinions L and M. The pinion L moves the internal tube over the

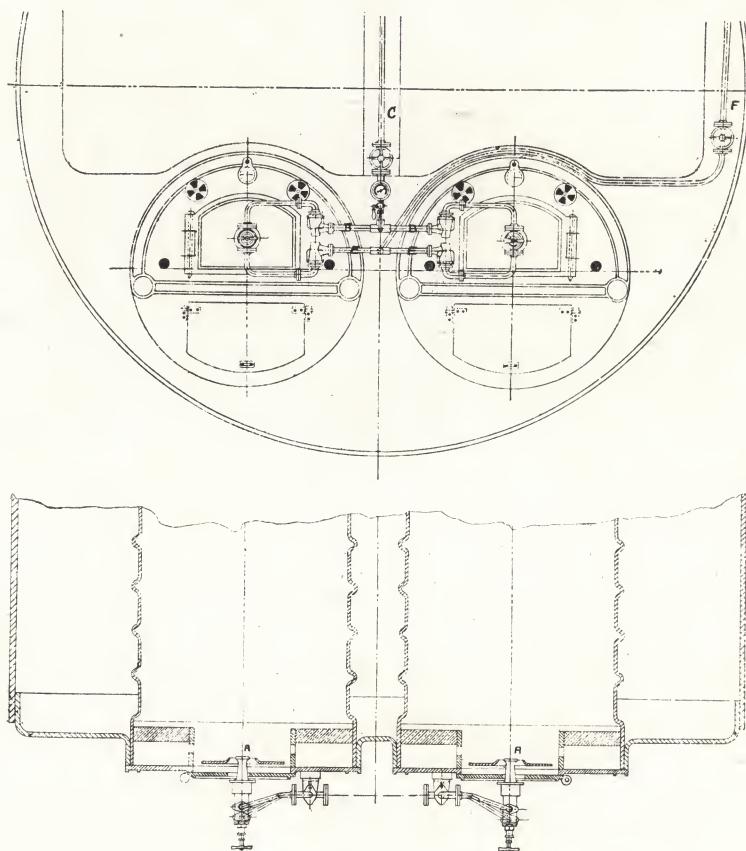


Fig. 1.—Marine Boiler with Steam Jet Burners.

oil delivery nozzle F, while the second pinion M varies the amount of air escaping round the mixed jet at the end of the helix K. At the point where combustion is about to commence, a further supply of compressed air is given, while another supply is added by the air coming through the firebars. A novel feature of the burner is that it can be used with low-pressure superheated steam should the supply of compressed air fail. No alteration of the boilers as arranged for coal firing is needed in this or the other systems about to be described.

The arrangement of the second, or "steam jet" system, as fitted to a boiler of the Scotch marine type, is illustrated by Fig. 1. The burners are placed at A. The oil is supplied

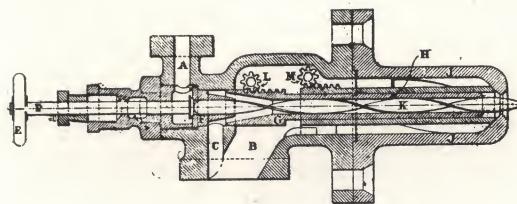


Fig. 2.—Air Jet Burner.

through the pipes EE connected to the main pipe F led from the oil supply tank, and the steam is led from the top of the boiler through the pipe C and supplied through the pipes BB. The burner is shown in detail in Fig. 3. The oil entering at B obtains a whirling motion by its passage round

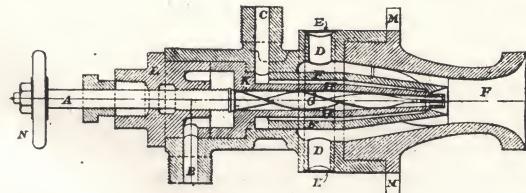


Fig. 3.—Steam and Induced Air Jet Burner.

the spiral stem G. The oil supply is regulated by the spindle A actuated by the hand wheel N. The steam entering at C passes around the hollow cone H and then through slots placed where the cylindrical portion of the cone H fits the inside of the hollow air cone F. The steam supply is regulated by screwing in or out the portion F and the cone attached. It will be seen that by this arrangement the whole of the oil passing through the burner is steam jacketed. The air cone F is fitted with spiral guides, over which the air is drawn from the openings DD by the inductive action of the steam. The amount of

air entering is regulated by means of the movable perforated strap E, the correct supply being readily determined by the character of the flame and the sound of the fire. The flame should be transparent and of an intense white colour, or somewhat pink when using light oils. It is claimed that the steam jet system recovers from 68 to 74 per cent. of the calorific value of the fuel.

The third and latest type of Kermode burner is the "pressure jet" burner, which is recommended for use with forced and induced draught. This burner is illustrated by Fig. 4. An inner cylinder B is surrounded by a casing D, upon the end of which is screwed the cap nut E. The end of B next the cap nut is made exactly to fit D and is provided with a number of grooves parallel with and at right angles to the axis of the burner, as shown at H. The oil enters at A, travels along between B and D, and then passes through these grooves to the annular opening formed between the conical end of the spindle C and the circular

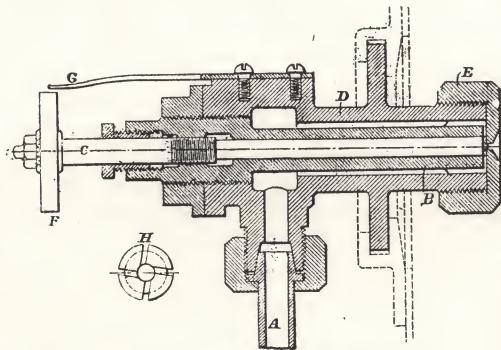
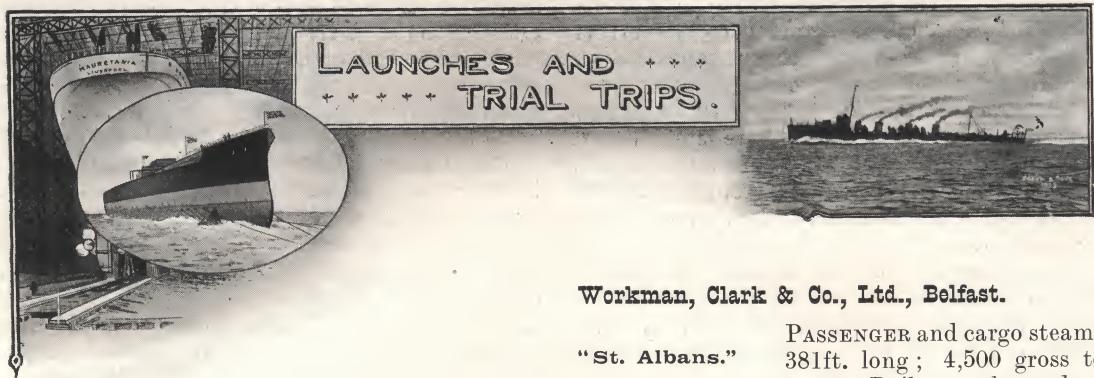


Fig. 4.—Pressure Jet Burner.

hole in the centre of E. The size of this opening is regulated by the movement of C, which is indicated by the graduated wheel F. With this burner neither steam nor air is required to disintegrate the oil, the pulverisation being effected by means of the pressure which is brought to bear upon the fuel by a force pump. Before use the oil is heated and carefully filtered. An installation of this type has just been completed for a small vessel built in Java and has given every satisfaction. The system is said to recover from 70 to 75 per cent. of the calorific value of the fuel. The application of the pressure jet system to a large passenger steamer is now under consideration, and some interesting speculations can be made as to what would be the effect upon the size and cost of building and running a large vessel like the *Mauretania* should the discovery of new sources of supply provide greater facilities for obtaining liquid fuel at a low cost.



IRELAND.

Dublin Dockyard Co., Dublin.

"**Cheslakee.**" PASSENGER steamer; 132ft., by 28ft., by 17 $\frac{3}{4}$ ft. Built for the Union Steamship Co., of British Columbia. The vessel has been designed in accordance with colonial ideas, and has three decks besides the 'tween decks. The triple expansion engines have cylinders 13 $\frac{1}{2}$, 22, and 36in., by 20in. stroke, taking steam from one specially large boiler intended for burning inferior coal. Trial trip, 1st June.

Harland & Wolff, Limited, Belfast.

"**Edinburgh Castle.**" TWIN-SCREW mail and passenger steamer; 585 $\frac{3}{4}$ ft. overall, by 64ft. 8in., by 42 $\frac{1}{2}$ ft.; 13,326 gross tonnage. Built to the order of the Union-Castle Mail Steamship Co. for their South and East African service. Accommodation is provided for 320 first, 220 second, and 250 third-class cabin passengers. The vessel is a sister ship to the *Balmoral Castle*, built by the Fairfield Shipbuilding & Engineering Co., and described and illustrated in our last issue. The two sets of quadruple expansion balanced engines take steam from ten boilers and indicate 12,500 horse-power. Trial trip, 29th April.

"**Pakeha.**" TWIN-SCREW passenger and cargo steamer; nearly 500ft. long, by 63ft. broad; 8,000 gross tonnage. Built to the order of the Shaw, Savill & Albion Co., Ltd., London, for their New Zealand traffic. The vessel is fitted with refrigerating machinery and insulated chambers. The two sets of quadruple expansion engines were constructed by the shipbuilders. Launched, 26th May.

Workman, Clark & Co., Ltd., Belfast.

"**St. Albans.**" PASSENGER and cargo steamer; 381ft. long; 4,500 gross tonnage. Built to the order of the Eastern and Australian Steamship Co., Ltd., London, for trade between Australian and Chinese ports. Accommodation for 63 first-class passengers is provided on the bridge and upper decks, in one, two, and three-berth staterooms; and for 36 second-class passengers, in large four-berth rooms, at the after end of the bridge space. Accommodation for European steerage passengers is also provided in the poop space, and for Chinese steerage passengers on the main deck forward. The cargo space is divided into four holds, one of which has been insulated and prepared for the carriage of frozen meat, while the 'tween deck space over this hold has also been insulated for meat and fruit cargoes and perishable stores. The propelling machinery consists of a set of triple expansion engines, with four boilers working under forced draught. Launched, 10th May.

TWIN-SCREW steamer, shelter-deck "**Murital.**" type, for the carriage of frozen meat; 486ft. long; 7,300 gross tonnage. Built to the order of the Tyser Line, Limited, for service between this country and Australia. The cargo space is divided into five holds, three being insulated and otherwise prepared for the carriage of frozen meat cargoes, for the preservation of which an extensive installation of refrigerating machinery is provided. Accommodation for a few passengers is situated in a deckhouse amidships. The propelling machinery consists of two sets of triple expansion engines, taking steam from four boilers working under forced draught. Trial trip, 8th June.

CARGO steamer; 488ft. long; over "**Kansas.**" 6,000 gross tonnage. Built for the Bucknall Steamship Lines, Limited, London. The cargo space is divided into five holds practically free of obstruction and

thus capable of receiving consignments of the largest nature, such as locomotives, boilers, etc. The propelling machinery consists of a set of

triple expansion engines, with three boilers working under forced draught. Launched, 25th June.

SCOTLAND.

Ailsa Shipbuilding Co., Limited.

"Cornerake." CARGO steamer, awning-deck type ; 240ft., by 35ft., by 25ft. ; 1,200 gross tonnage.

Built to the order of the General Steam Navigation Co., Ltd., London, for their Continental trade. Launched at Troon, 12th May.

"Storeton." TWIN-SCREW ferry steamer ; 150ft., by 33ft., by 10ft. Built to the order of the Birkenhead

Corporation for the New Ferry and Rock Ferry service. The vessel carries about 1,200 passengers, for whose comfort three saloons are provided. Trial trip, 12th June.

Ardrossan Shipbuilding Co., Ardrossan.

"Canonbar." PASSENGER and cargo steamer ; 185ft., by 32ft., by 12ft. Built for the North Coast Steam

Navigation Co., Sydney, N.S.W. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. Launched, 14th April.

Barclay, Curle & Co., Ltd., Whiteinch.

"City of Chester." CARGO steamer, two-deck type ; 422ft., by 52ft., by 33ft. 1in. ; about 5,500 gross tonnage ; about 10,000 tons deadweight. Built for the Ellerman Lines, Limited. The propelling machinery was constructed by the shipbuilders. Launched, 25th April.

Wm. Beardmore & Co., Limited, Dalmuir.

"Shieldhall." TWIN-SCREW hopper steamer ; 260ft., by 42ft., by 16ft. ; about 3,000 tons displacement. Built for the Corporation of Glasgow. The sludge tanks are built in four watertight divisions, which empty themselves through valves in the bottom of the ship. The propelling machinery consists of two sets of triple expansion engines with cylinders 15, 24 and 41in., by 27in. stroke, taking steam from two boilers. Trial trip, 20th April.

Bow, M'Lachlan & Co., Ltd., Paisley.

"Volo." STEAM yacht ; 122ft., by 18½ft., by 11ft. ; 160 tons yacht measurement. Built for Mr. William Bow, Dun-

score, Paisley. The accommodation includes a large deck saloon, dining saloon, and owner's and guests' cabins. On the trial trip, which took place on the 25th May, a speed of 11.04 knots was attained.

H.M.S. "Resource." SALVAGE vessel ; 730 tons displacement. The vessel has been specially designed for lifting and laying heavy moorings and for salvage work. The propelling machinery indicates 500 horse-power. Launched with steam up, 7th June.

George Brown & Co., Greenock.

"Owenaminane." HOPPER grab dredger ; 135ft., by 27ft., by 13ft. Built for the Cork Harbour Commissioners. The propelling machinery was supplied by Messrs. Goultide, Gillespie and Co., Glasgow, and the cranes and Priestman grabs by Messrs. Clarke, Chapman & Co., Gateshead. Launched, 9th June.

John Brown & Co., Ltd., Clydebank.

"Doris." TWIN-SCREW yacht ; 228ft. B.P., 270ft. overall, by 31ft. beam ; 1,000 tons Thames yacht measurement. Built for Mr. S. B. Joel. The vessel is of the shade-deck type, and has a large promenade deck amidships and a built-up forecastle. All the owner's and guests' rooms were fitted and upholstered by Messrs. Waring & Gillow, London. The vessel carries six small boats, including two steam launches and a motor launch. The two sets of four-crank triple expansion engines have cylinders 16, 26, 30 and 30in., by 26in. stroke, and take steam from two return-tube boilers. Launched, 9th April.

"St. Petersburg." TRIPLE-SCREW turbine cross-channel steamer ; 343ft., by 43ft., by 26½ft. ; about 2,600 gross tonnage. Built to the order of the Great Eastern Railway Company, for their Harwich-Hook of Holland service. Accommodation is provided on the lower, main, and awning decks for over 300 first-class passengers, and on the lower and main decks for 110 second-class passengers. The greater part of the first-class accommodation is arranged in

two-berth rooms, while on the awning deck a number of cabins are fitted each to accommodate one person. At the fore end of the boat deck a *cabine de luxe* is fitted. The second-class passengers are berthed in rooms containing from two to ten persons. The first-class dining saloon is situated on the lower deck, and immediately over the main deck there is a ladies' room, the smoking room being on the awning deck. The propelling machinery, constructed by the ship-builders, consists of a set of Parsons steam turbines comprising one high-pressure and two

200 first, 120 second, and 126 third-class passengers. The first-class accommodation, consisting of two and three-berth staterooms and the usual public rooms, is situated amidships on the upper, shelter, and promenade decks. The second-class accommodation is placed aft on the upper and shelter decks, and comprises staterooms, dining saloon, music and smoking rooms. The third-class accommodation is situated forward on the main, upper, and shelter decks, the cabins being arranged for from two to six passengers. The two sets of quadruple expansion engines were

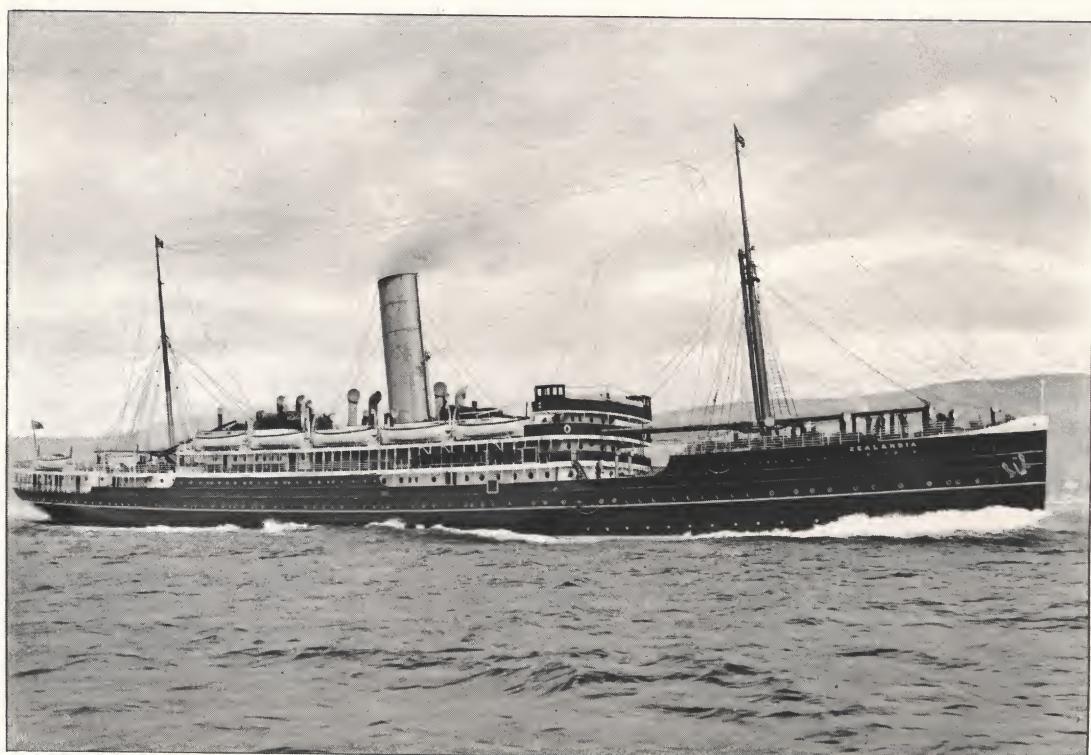


Photo by]

T.S.S. "Zealandia."

[Frank & Sons, So. Shields.

low-pressure turbines, with two astern turbines fitted within the low-pressure turbine casings. Steam is supplied by five boilers working on the closed stokehold system of forced draught. Launched, 25th April.

"Zealandia." TWIN-SCREW passenger and cargo steamer; 410ft., by 54 $\frac{1}{2}$ ft., by 34ft.; 6,600 gross tonnage. Built to the order of the Huddart, Parker & Co. Proprietary, Ltd., Melbourne, Australia, for service between the various ports round the coast of Australia and the adjacent islands. Accommodation is provided for about

constructed by the shipbuilders, and take steam from seven boilers arranged in one boiler-room and working under Howden's forced draught. On the trials, which concluded on the 4th May, a mean speed of 16.1 knots was obtained on the measured mile, and 15.8 knots on a continuous run of nine hours' duration.

Caledon Shipbuilding & Eng. Co., Ltd., Dundee. PASSENGER and cargo steamer; "Royal Scot." 301ft., by 38ft., by 19 $\frac{1}{4}$ ft. Built to the order of the London and Edinburgh Shipping Co., for trade between

Leith and London. The triple expansion engines were constructed by the shipbuilders. Launched, 10th May.

Campbeltown Shipbuilding Co., Campbeltown.

CARGO steamer, single-deck type ; "Anna." 2,200 tons deadweight. Built for German owners. The propelling machinery was constructed by Messrs. J. G. Kincaid & Co., Greenock. Launched, 7th June.

Clyde Shipbldg. & Eng. Co., Ltd., Port-Glasgow.

PACKAGE freight steamer ; "A. E. McKinstry." 250ft., by 42½ft., by 20½ft. Built for service on the Canadian Great Lakes. The propelling machinery was constructed by the shipbuilders. Launched, 25th April.

PACKAGE freight steamer ; 250ft., "Renvoyle." by 42½ft., by 18½ft. Built for service on the Canadian Great Lakes. The propelling machinery was constructed by the shipbuilders. Launched, 28th May.

Charles Connell & Co., Limited, Scotstoun.

TWIN-SCREW passenger and cargo steamer ; about 9,000 gross tonnage. Built to the order of Messrs. Donaldson Brothers, Glasgow, for service between this country and Canada. Accommodation is provided for 260 second-class and 1,000 steerage passengers, all in two and four-berth rooms. The smoking room, ladies' room, music room, and staterooms for second-class passengers are all situated amidships. A complete system of refrigerating machinery is installed, and the vessel is also fitted with wireless telegraphy. The two sets of triple expansion engines, of 6,000 I.H.P., were constructed by Messrs. Dunsmuir and Jackson, Govan, and take steam from six boilers. On a series of runs over the measured mile the vessel attained 15½ knots, the designed service speed being about 13½ knots. Trials completed, 26th May.

CARGO steamer ; 470ft., "Knight Companion." by 58ft., by 34ft. 10in.; 11,400 tons deadweight. Built for the Knight Steamships Co., Ltd. (Messrs. Greenshields, Cowie & Co.), Liverpool. Triple expansion engines are fitted. Launched, 22nd June.

Wm. Denny & Brothers, Dumbarton.

26-KNOT torpedo-boat destroyer. "Yarra." The vessel is one of three ordered by the Commonwealth of Australia

in April, 1909, two from the Fairfield Shipbuilding and Engineering Co., Govan, and the other from Messrs. Denny. The *Yarra* is a sister ship to the *Parramatta*, described below. Launched, 9th April.

Robert Duncan & Co., Port-Glasgow.

CARGO steamer ; 310ft., by 46ft., by "Olga." 23ft.; 4,500 tons deadweight. Built for Messrs. Emile Frisch and Co., Marseilles. The propelling machinery was constructed by Messrs. D. Rowan & Co., Glasgow. Launched, 6th June.

Dundee Shipbuilding Company, Dundee.

PASSENGER and cargo steamer ; "Fogota." 145ft., by 24½ft., by 10½ft. Built to the order of St. John's (Newfoundland) owners, and designed with heavy scantlings for navigation among ice. Accommodation is provided for 40 first-class and 30 steerage passengers. Launched, 10th May.

CARGO steamer ; 220ft., "Svetol Spiridon." by 30ft., by 13¾ft.; 1,500 tons deadweight. Built to the order of Russian owners for the Mediterranean trade. Launched, 23rd June.

Fairfield Shipbuilding & Eng. Co., Ltd., Govan.

27-KNOT torpedo-boat destroyer. The vessel is the first of three placed with H.M.S. "Cameleon." the Fairfield Company last year, the other two being the *Comet* and *Goldfinch*. Launched, 1st June.

TORPEDO-BOAT destroyer ; "Parramatta." 245½ft., by 24½ft.; 700 tons displacement. The vessel is the first of three ordered by the Commonwealth of Australia in April, 1909. The second is also being built by the Fairfield Co., and the third by Messrs. William Denny & Brothers, Dumbarton. The design of the vessels is based on the first British "River" class, with such improvements in arrangement and machinery as experience has suggested since that class was completed. The armament consists of one 4-in. gun and three 12-pounders, with three 18-in. torpedo tubes. The propelling machinery is of the Parsons turbine type, steam being generated in water-tube boilers arranged to burn oil fuel. The vessel has been built under the superintendence of Professor J. H. Biles, Glasgow. On the 14th June, a twenty-four hours' trial was commenced in order to ascertain the consumption of oil at a cruising speed of not less than

14 knots. On account of local conditions, the Commonwealth Government decided that the vessel should have a radius of action of not less than 2,500 nautical miles, and the contract stipulated that the oil tanks should be of sufficient capacity to enable the vessel to steam this distance at 14 knots. On this trial, the oil carried was sufficient for 3,000 nautical miles, and the result showed that if the vessel starts with all her tanks full, leaving the usual breathing spaces, her endurance will be 20 per cent. greater than 3,000 nautical miles at 14 knots' speed. The eight hours' full trial was run on the 17th June, the vessel starting under the same conditions as on the 24 hours' trial. In the first hour, two runs were made on the measured mile at Skelmorlie, the mean speed being 27.55 knots. In the fifth hour, six runs were made, the mean of which gave a speed of 27.33 knots. In the eighth hour of the vessel's continuous steaming, two runs were made, the mean of which gave a speed of 28.48 knots. In view of the contract speed of 26 knots, these speeds are extremely satisfactory, and they were obtained without forcing the boilers in any way. The amount of oil burned in relation to the size of boilers was very much less than that permitted by the Admiralty in the conditions laid down for the six special destroyers recently ordered, and it was also far below the stipulations of the Commonwealth Government. At the rate of fuel consumption shown on this eight hours' trial, the *Parramatta* could actually maintain her high speed for 1,000 nautical miles, if she started with her tanks full. This is said to be a much greater distance than any other destroyer can steam at full speed.

Ferguson Brothers, Port-Glasgow.

"Tehaka." SCREW hopper dredger. Built for the Lyttelton Harbour Board, New Zealand. The vessel has a capacity of 350 tons per hour. Launched, 25th April.

"Heito Maru." TWIN-SCREW barge-loading bucket dredger. Built to the order of the Southern Manchurian Railway Co., for service at Dalny Harbour. The vessel is of the bow-well centre bucket ladder type, and is capable of raising 1,000 tons per hour from a depth of 46 feet. Side shoots are arranged for discharging the dredged material over either side into hopper barges, the lifting and lowering of each shoot being worked by an independent steam engine. The main engines are employed for either propelling the vessel or driving the dredging gear. Two boilers supply steam to the various engines. Launched with steam up, 5th May.

John Fullerton & Co., Paisley.

PASSENGER steamer; 200 tons.
"Alert." Built to the order of the Guernsey Steam Towing and Trading Co., Guernsey, for traffic among the Channel Islands and to St. Malo. The triple expansion engines, by Messrs. Ross & Duncan, Govan, indicate 700 horse-power. Launched, 8th June.

Greenock & Grangemouth Dockyard Co., Ltd.

CARGO steamer; 235ft., by 36ft., by 18ft. 4in. Built for Messrs. James Currie & Co., Leith. The triple expansion engines were constructed by Messrs. Richardsons, Westgarth and Co., Ltd., Middlesbrough. Launched at Grangemouth, 12th April.

OIL-TANK steamer; 260ft., by 41ft., by 20½ft.; 1,850 tons deadweight. Built for the Anglo-American Oil Co., Ltd., London. The vessel has ten compartments for the carriage of oil in bulk, and is capable of carrying all kinds of oil from benzine to the heaviest grades. American towing machinery is fitted, which enables barges to be towed either alongside or astern. The triple expansion engines, by Messrs. J. G. Kincaid and Co., Ltd., Greenock, have cylinders 19½, 32 and 53in., by 36in. stroke. Trial trip, 27th May.

Wm. Hamilton & Co., Ltd., Port-Glasgow.

PASSENGER and cargo steamer; 260½ ft., by 38 ft., by 18½ ft. The vessel was constructed on the Isherwood system of longitudinal framing and classed with Lloyd's Register. Built to the order of Messrs. John Holt & Co. (Liverpool) Limited, for the West African trade. Accommodation for passengers is provided in houses on the shelter deck. A large refrigerating plant with cooling chambers is fitted. The triple expansion engines, by Messrs. D. Rowan & Co., Glasgow, have cylinders 18, 30 and 50in., by 33in. stroke, with two boilers. Launched, 7th June.

CARGO steamer; 393ft., by 50ft., by 29½ft.; 7,200 tons deadweight.

The vessel was constructed on the Isherwood system of longitudinal framing and classed with Lloyd's Register. Built for the Lancashire Shipping Co., Limited (Messrs. James Chambers and Co.), Liverpool. The triple expansion engines, by Messrs. David Rowan & Co., Glasgow, have cylinders 25½, 42 and 70in., by 48in. stroke, with two boilers working under Howden's forced draught. Trial trip, 10th June.

D. & W. Henderson & Co., Ltd., Partick.

"Duchess of Richmond." PADDLE steamer ; 198ft., by 26ft., by 9ft. Built to

the order of the London & South Western and London, Brighton & South Coast Railway Companies, for their Portsmouth and Isle of Wight traffic. The first-class accommodation is aft, and the second-class forward. The compound diagonal engines have cylinders 27 and 51in., by 54in. stroke, steam being supplied by a double-ended boiler working at 130 lbs. pressure. Launched, 11th June.

"Lisboa." TWIN-SCREW mail and passenger steamer ; 452ft., by 54ft., by 37½ft.; about 7,200 gross tonnage. Built

to the order of the Empreza Nacional de Navegacao a Vapor, Lisbon, for service between Portugal and Portuguese Possessions in Africa. Accommodation is provided for first, second, and third-class passengers. The first-class accommodation is situated amidships, and includes sleeping accommodation for 110 passengers in two and three-berth staterooms, a dining saloon, drawing room, and smoking room. The accommodation for 64 second-class passengers is situated aft, while the 142 third-class passengers are provided for forward on the upper deck. On the same deck aft arrangements have been made for carrying 100 steerage passengers. The two sets of triple expansion engines, constructed by the shipbuilders, have cylinders 25, 41 and 67½in., by 48in. stroke, with six boilers. On the trial, which took place on the 14th June, a mean speed of 16½ knots was obtained on the measured mile.

A. & J. Inglis, Ltd., Pointhouse.

"Weeroona." PADDLE steamer ; 310ft., by 36ft., by 12½ft. Built to the order of the Huddart, Parker

and Co. Proprietary, Ltd., Melbourne, Australia, for excursion traffic inside Port Philip Heads. The vessel has been designed to carry about 2,200 saloon passengers, and has three complete decks all fore and aft, *viz.*, cabin, main, and promenade, with upper promenade deck amidships and sun roof. Two dining saloons, accommodating about 250 persons, are provided at the fore and after ends of the cabin deck. A lounge room is placed on the main deck aft, with ladies' boudoir adjoining. A tea and coffee restaurant and fruit and bookstall are fitted up at the entrance to the lounge room. A smoking room and barber's shop are also provided. The propelling machinery consists of three-cylinder compound engines taking steam from six Navy type boilers. Launched, 8th June.

Archd. McMillan & Son, Ltd., Dumbarton.

CARGO steamer, for "Thomas J. Drummond." service on the Canadian Great Lakes ; 256ft., by 44ft., by 26ft. The propelling machinery was constructed by Messrs. Muir and Houston, Ltd., Glasgow, and is placed aft. Launched, 3rd May.

CARGO steamer ; 400ft., by "Crosshill." 52ft., by 30ft.; 8,300 tons deadweight. Built for Messrs. Macbeth & Co., Ltd., Glasgow. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. Trial trip, 9th June.

Napier & Miller, Ltd., Old Kilpatrick.

SALOON paddle steamer ; 215ft., "Eagle III." by 25ft., by 8½ft. Built to the order of Messrs. A. & J. Inglis, Ltd., Pointhouse, for the Buchanan Steamers, Limited, and intended for passenger and excursion traffic on the Clyde. There are two complete decks, the uppermost forming a promenade the whole length of the ship. Ample accommodation for first-class passengers is provided aft on the main deck, the dining saloon being below. Forward and under the promenade deck is fitted a spacious deck saloon for second-class passengers. The propelling machinery was constructed by Messrs. A. & J. Inglis, Limited. Trial trip, 31st May.

CARGO steamer ; 405ft., by "Den of Glamis." 52ft., by 30½ft.; 5,100 gross tonnage. Built for Messrs. Charles Barrie & Sons, Dundee. The vessel has a Board of Trade passenger certificate. The triple expansion engines, by Messrs. D. Rowan and Co., Glasgow, have cylinders 27, 44 and 73in., by 48in. stroke, with two boilers working under Howden's forced draught. A donkey boiler is also fitted. Launched, 9th June.

Ramage & Ferguson, Ltd., Leith.

CARGO steamer. Built to the "Kingstown." order of Messrs. John Weatherill and Sons, Dublin, for their coasting trade. Trial trip, 16th May.

CARGO steamer ; 300 tons dead-weight. Built to the order of "Carnduff." Messrs. Howden Brothers, Larne, for their general coasting trade. The compound engines and one boiler are placed aft. Launched, 9th June.

A. Rodger & Co., Port Glasgow.

COLLIER ; 225ft., by 33ft., by "Ngatoro." 16½ft.; 1,500 tons deadweight. Built for the Blackball Coal Co.,

New Zealand. The propelling machinery was constructed by the shipbuilders at their Govan Works. Launched, 5th May.

Russell & Co., Port-Glasgow.

"Earl of Forfar." CARGO steamer; 400ft., by 50ft., by 29ft.; 7,500 tons deadweight. Built for Messrs. Marshall & Dobie, Glasgow. The propelling machinery was constructed by Messrs. Rankin & Blackmore, Greenock. Launched, 14th April.

"Highland Corrie." PASSENGER and cargo steamer; 430ft., by 56ft., by 29½ft.; 7,400 gross tonnage. Built to the order of Messrs. H. and W. Nelson, Liverpool, for trade between Buenos Ayres and Great Britain. Accommodation is provided for 80 first and 30 second-class passengers. The holds are insulated throughout for the carriage of frozen meat. The propelling machinery was constructed by Messrs. Rankin and Blackmore, Greenock. Launched, 21st May.

"Roserie." CARGO steamer, shelter-deck type; 405ft., by 52ft., by 28½ft.; 4,700 gross tonnage. Built to the order of Messrs. Andrew Weir & Co., Glasgow and London, for their special service in the Pacific. The propelling machinery was constructed by Messrs. Rankin and Blackmore, Greenock. Trial trip, 6th June.

"Highland Scot." PASSENGER and cargo steamer. The vessel is a sister ship to the *Highland Corrie*, and was built for the same owners. Launched, 11th June.

Scott & Sons, Bowling.

"Onyx." CARGO steamer; 175ft., by 28ft., by 13ft. Built to the order of Mr. William Robertson, Glasgow, for his general coasting trade. The triple expansion engines were constructed by Messrs. Muir and Houston, Glasgow. Launched, 25th May.

"Kinnaird Head." CARGO steamer; 112ft., by 21ft., by 9½ft. Built to the order of Messrs. A. F. Henry & MacGregor, Leith, for their Fraserburgh and general coasting trade. The compound engines were constructed by Messrs. Gouldie, Gillespie & Co., Glasgow. Launched, 22nd June.

Scott's Shipbuilding & Eng. Co., Greenock.

H.M.S. "Colossus." BATTLESHIP of the improved *Dreadnought* type. The vessel is a sister ship

to the *Hercules*, launched by Palmers Shipbuilding and Iron Co., Jarrow, and described elsewhere in the present issue. Launched, 9th April.

Alex. Stephen & Sons, Limited, Linthouse.

"Levuka." TWIN-SCREW passenger and cargo steamer; 400ft., by 55ft., by 41ft. Built to the order of the Australasian United Steam Navigation Co., Ltd., for the Australian coasting and Pacific trade. Extensive accommodation for first and second-class passengers is provided. The vessel will also carry a considerable quantity of cargo, and has been specially constructed for the carriage of perishable fruit, the greater portion of the cargo space being insulated for this purpose. The propelling machinery, constructed by the shipbuilders, consists of two sets of quadruple expansion balanced engines, taking steam from six boilers. Trial trip, 20th April.

"Damara." CARGO steamer; 403ft., by 52ft., by 30ft. Built for Messrs. Maclay and McIntyre, Glasgow. The triple expansion engines, constructed by the shipbuilders, have cylinders 25, 41 and 67in., by 5in. stroke, and take steam from three boilers fitted with Howden's forced draught. Trial trip, 1st June.

"Zeelandia." TWIN-SCREW mail and passenger steamer; 460ft., by 55ft., by 37ft. Built to the order of the Koninklyke Hollandsche Lloyd, Amsterdam, for service between Holland and South America. The passenger accommodation occupies four decks, and consists of first-class, intermediate, and third-class, a large number of the first-class passengers being accommodated in single-berth and the remainder in two-berth cabins. The first-class public rooms include dining saloon, social hall and entrance, smoking room, and children's room, in addition to which there is a large open-air café or verandah on the promenade deck. The intermediate accommodation is placed aft in the poop, and comprises excellent staterooms (many arranged as two-berth cabins) and a large dining room and social hall opening on to a covered deck, with a promenade space above. The third-class passengers are berthed in the 'tween decks, and are provided with dining spaces, etc., and numerous baths and lavatories in deckhouses on the weather deck. While principally designed for passengers, the vessel will carry a large cargo, in addition to the great quantity of coal and stores required for the voyage from Amsterdam to Buenos Ayres. A large portion of the cargo space has been divided off and insulated for the reception of frozen goods, the refrigerating machinery having

been supplied by Messrs. J. & E. Hall, Limited. The two sets of triple expansion engines were constructed by the shipbuilders, and take steam from three double-ended boilers, with one single-ended boiler in reserve, all working under Howden's forced draught. On the trial, which took place on the 30th June, a speed, loaded, of 16 knots was obtained.

Yarrow & Co., Limited, Scotstoun.

27-KNOT torpedo-boat destroyer ; "Sergipe." 240ft. long, by 23½ft. beam. The vessel is the last of the ten destroyers ordered by the Brazilian Government

from Messrs. Yarrow. The two sets of triple expansion four-cylinder engines, constructed by the shipbuilders, take steam from two double-ended Yarrow boilers, each boiler supplying steam for about 4,000 H.P. Launched, 10th May.

27-KNOT torpedo-boat destroyer. "**Parana.**" The vessel is the ninth of the ten destroyers ordered by the Brazilian Government from Messrs. Yarrow, and is similar to the *Sergipe*, described above. On the trials, which took place on the 17th May, a mean speed of 28.736 knots was obtained during a continuous run of three hours carrying a load of 100 tons.

THE TYNE.

Sir W. G. Armstrong, Whitworth & Co., Ltd.

CARGO steamer, shelter-deck type ; "Tripoli." 496ft., by 51ft., by 28ft. lin. ; 7,700 tons deadweight. Built for Mr. Edward C. Thin, Liverpool. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 26, 43 and 72in., by 48in. stroke, with two boilers. Trial trip, 22nd April.

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn.

SPECIAL type of ore-carrying steamer ; "Sir Ernest Cassel." 458 ft., by 60ft., by 34ft. ; 11,000 tons deadweight. Built for the Rederiak tiebolaget Lulea-Ofoten, Stockholm. The special feature of the vessel's construction consists of twelve gravity-discharge ore pockets of the Johnson-Welin type, instead of the usual holds. Between these pockets, discharge compartments are arranged, in which are placed the chutes to deliver the ore by gravity in iron skips. The discharge compartments extend from the deck to the bottom of the ship. There are twelve powerful electric cranes on deck, which enable the skips to be worked almost continuously. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 27, 45 and 74in., by 54in. stroke, with three boilers. Launched, 23rd April.

CARGO steamer ; "Port Curtis." 52½ft., by 28ft. 10½in. ; 8,100 tons deadweight. Built for Messrs. William Milburn & Co., London. The quadruple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 25½, 36, 52½ and 76in., by 51in. stroke, with three boilers. Launched, 8th June.

Northumberland Shipbuilding Co., Ltd., Howdon.

CARGO steamer ; "Brantford." 51ft. 4½in., by 28ft. 4½in. ; 7,300 tons deadweight. Built for Messrs. Furness, Withy & Co., Ltd., West Hartlepool. The triple expansion engines, by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, have cylinders 25, 40 and 67in., by 45in. stroke, with three boilers. Trial trip, 6th April.

CARGO steamer ; "Indian Transport." by 51ft. 4½in., by 28ft. 4½in. ; 7,350 tons deadweight. Built to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd. (Messrs. Houlder Brothers & Co., Ltd., managers), London. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Sunderland, have cylinders 25, 40 and 67in., by 45in. stroke, with three boilers. Trial trip, 9th May.

CARGO steamer. The vessel is a sister ship to the *Indian Transport*, and was built for the same owners. Trial trip, 25th May.

CARGO steamer, shelter-deck type ; "Marengo." 425ft. long, by 52ft. beam ; 8,750 tons deadweight. Built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., Hull, for their Atlantic trade. The vessel has three complete steel decks, including a shelter deck all fore and aft. The shelter 'tween deck is arranged so that a large number of emigrants, troops, horses or cattle can be carried. The triple expansion engines, by Palmers Shipbuilding and Iron Co., Ltd., Jarrow, have cylinders 28, 46½ and 78in., by 54in. stroke, with three boilers working

under Howden's forced draught. Launched, 8th June.

"Natal Transport." CARGO steamer. The vessel is a sister ship to the *Indian Transport* and *Cape Transport*, and was built for the same owners. Trial trip, 16th June.

Palmers Shipbuilding & Iron Co., Ltd., Jarrow.

H.M.S. "Hercules." BATTLESHIP of the improved *Dreadnought* type; 510ft., by 86ft.; 20,250 tons displacement on a draught of 27½ft. The main armament consists of ten guns of 12-in. bore and 50 calibres, arranged in pairs in five

be generated in water-tube boilers arranged to burn both coal and oil fuel. The designed speed is 21 knots, although the ship will probably reach 22 knots on trial. Launched, 10th May.

"Janus." PASSENGER and cargo steamer, three-deck type; 400ft., by 52ft. 10in., by 27½ft.; 7,500 tons dead-weight. Built for Messrs. Archibald Currie and Co., Melbourne. Accommodation is provided on the promenade and shelter decks amidships for 58 first-class passengers, together with dining saloon. The deck over this accommodation is extended to the vessel's side, forming a promenade deck over 100ft. long, on which are deck-houses containing smoking room, saloon entrance,



Photo by]

Launch of H.M.S. "Hercules."

[Frank & Sons, So. Shields.

turrets, three on the centre-line of the ship and one *en echelon* on each side. The middle turret on the centre-line is raised so that its guns will fire over those of the after turret. This arrangement will enable all the ten guns to be fired on either broadside, eight astern, and six ahead; whereas the earlier all-big-gun battleships of the British Navy can only fire eight of their ten large weapons on either port or starboard side. The anti-torpedo armament consists of sixteen 4·7-in. guns. The *Hercules* will be propelled by Parsons turbines, manufactured by the shipbuilders, indicating 25,000 horse-power and working four propellers on separate shafts, each shaft having one ahead and one astern turbine. Steam will

and social hall. Accommodation for 32 second-class passengers is provided below the shelter deck aft, the second-class smoking room and saloon entrance being on the shelter deck aft. All the available space on the decks is specially arranged for carrying horses. The triple expansion engines have cylinders 28, 46 and 76in., by 51in. stroke, with three boilers working under Howden's forced draught. Trial trip, 9th June.

John Readhead & Sons, Ltd., South Shields.

"Elmwood." CARGO steamer, improved single-deck type; 358½ft., by 49ft., by 26ft. 8½in. Built for Messrs. Walter Runciman & Co., Newcastle. The triple

expansion engines, constructed by the ship-builders, have cylinders 25, 42 and 68in., by 45in. stroke, with two boilers and one donkey boiler. Trial trip, 2nd May.

"Indian Prince." PASSENGER and cargo steamer; 352ft., by 46ft. $2\frac{1}{2}$ in., by 31ft.

8 $\frac{1}{2}$ in. Built to the order of the Prince Line, Limited (Mr. James Knott, M.P., managing director), Newcastle. The staterooms for passengers and the dining room, in polished oak, are contained in a large steel deckhouse amidships. The triple expansion engines, constructed by the shipbuilders, have cylinders 25, 42 and 69in., by 45in. stroke, with two boilers working under Howden's forced draught. Launched, 26th May.

J. P. Rennoldson & Sons, South Shields.

"Cabo da Roca." SCREW tug; 100ft., by 22ft., by 12ft. Built to the order of the Harbour Board of Lisbon, for sea and harbour towage and for fire and salvage purposes. The triple-compound engines and one boiler were constructed by the shipbuilders. Trial trip, 11th April.

Swan, Hunter, & Wigham Richardson, Ltd.

"Prince George." TWIN-SCREW passenger steamer; 320ft., by 42ft. 2in., by 18ft. depth to

the main deck. The vessel is the second of two similar ships built to the order of the Grand Trunk Pacific Railway Co., of Canada, for service between Prince Rupert and Vancouver Island, and onwards to Seattle or Tacoma. The *Prince George* presents a smart appearance, with her straight stem and cruiser stern, two pole masts, and three funnels. The rounded cruiser stern has been adopted in order to obtain the best lines for high speed. On the shelter and shade decks of the vessel, there is accommodation, in staterooms of two berths each, for about 220 first-class passengers. There are also a few sets of staterooms *en suite*, placed on the shelter deck amidships. The second-class accommodation is situated on the main deck forward, and when occasion arises about 1,500 excursionists can be taken on board. A pleasant feature of the first class accommodation is two spacious corridors running fore and aft, one on each side of the engine casing; and, to enhance the general appearance, light is given from several domes in a long roof, which has also clerestory lights. The first-class dining saloon, on the main deck, is placed at the extreme end of the vessel. The rounded shape of the cruiser stern makes an extremely handsome room, which is furnished

and panelled in oak, and fitted with small tables placed in alcoves. The first-class smoking room is situated at the after end of the shade deck, and is panelled in fumed oak. The second-class smoking room is placed at the forward end of the shelter deck. Special accommodation is provided for ladies in the shape of a music room, daintily furnished in light colours, the woodwork being white enamelled. The main staircase of the vessel is a notable feature, the panelling of the walls being in white enamel, with the balustrades of wrought iron, elegantly designed. On the shade deck, forward of the funnels, is the observation room, panelled in maple and sycamore. This room is specially lofty and well lighted by very large square windows, allowing passengers to have an uninterrupted view of the scenery *en route*. The vessel is provided with a wireless telegraphy installation, and refrigerating machinery for ship's stores, dairy produce, etc. The rudder is of the balanced type, and is wholly below the waterline. The two sets of triple expansion engines, by the Wallsend Slipway and Engineering Co., Ltd., are balanced on the Yarrow, Schlick and Tweedy System. On the six hours' loaded trial, which took place on the 23rd April, an average speed of over 19 knots was obtained.

"Carthage." TWIN-SCREW mail and passenger steamer; 400ft. long, by 51ft.

Built to the order of the Cie. Generale Transatlantique, Paris, for service between Marseilles and Algeria. First-class accommodation for 170 passengers is arranged amidships, and includes some *de luxe* rooms. The public rooms comprise dining saloon, lounge, smoking room, etc. Accommodation is also provided for 94 second-class passengers aft and 70 third-class passengers forward. The two sets of four-crank triple expansion engines, balanced on the Yarrow, Schlick and Tweedy system, were constructed by the shipbuilders, and take steam from eight boilers fitted with Howden's forced draught. The vessel will have a speed of 19 knots. Launched at Walker, 25th April.

"Keystorm." CARGO steamer; 250ft. long, by 42 $\frac{1}{2}$ ft.; 2,300 tons deadweight.

Built to the order of the Keystone Transportation Co., Montreal, for service on the Canadian Lakes. The triple expansion engines, placed aft, were constructed by the North Eastern Marine Engineering Co., Ltd., Wallsend. Trial trip, 29th April.

"Indrabarah." TWIN-SCREW steamer, shelter-deck type; 470ft., by 58ft., by 43ft.; about 7,000 gross tonnage. Built to the order of the Indra Line,

Limited (Sir T. B. Royden, Bart., managing owner), Liverpool, for the carriage of refrigerated cargoes from Australia and New Zealand. Three of the holds and the 'tween decks are insulated. Accommodation is provided for about twelve first-class passengers. The twin-screw engines and boilers were constructed by Messrs. Richardson, Westgarth & Co., Ltd., West Hartlepool, and will give the vessel a speed of 13 knots. Launched at Wallsend, 8th June.

MAIL and passenger steamer ; "Sidi Brahim." 325ft. long, by 41ft. Built to the order of the Société Générale de Transports Maritimes à Vapeur, Marseilles,

and there is also a cold chamber with refrigerating machinery. The four-crank triple expansion engines, balanced on the Yarrow, Schlick and Tweedy system, were constructed by the ship-builders and take steam from four boilers fitted with Howden's forced draught. On the trials, which took place on the 8th June, a speed of over $17\frac{1}{4}$ knots was attained on a continuous run of several hours' duration.

CARGO steamer ; 275ft. long, by "Tadorna." 36ft. beam ; 2,450 tons deadweight. Built to the order of the Cork Steamship Co., Ltd., Cork, for service between Manchester, Liverpool, and Dutch and

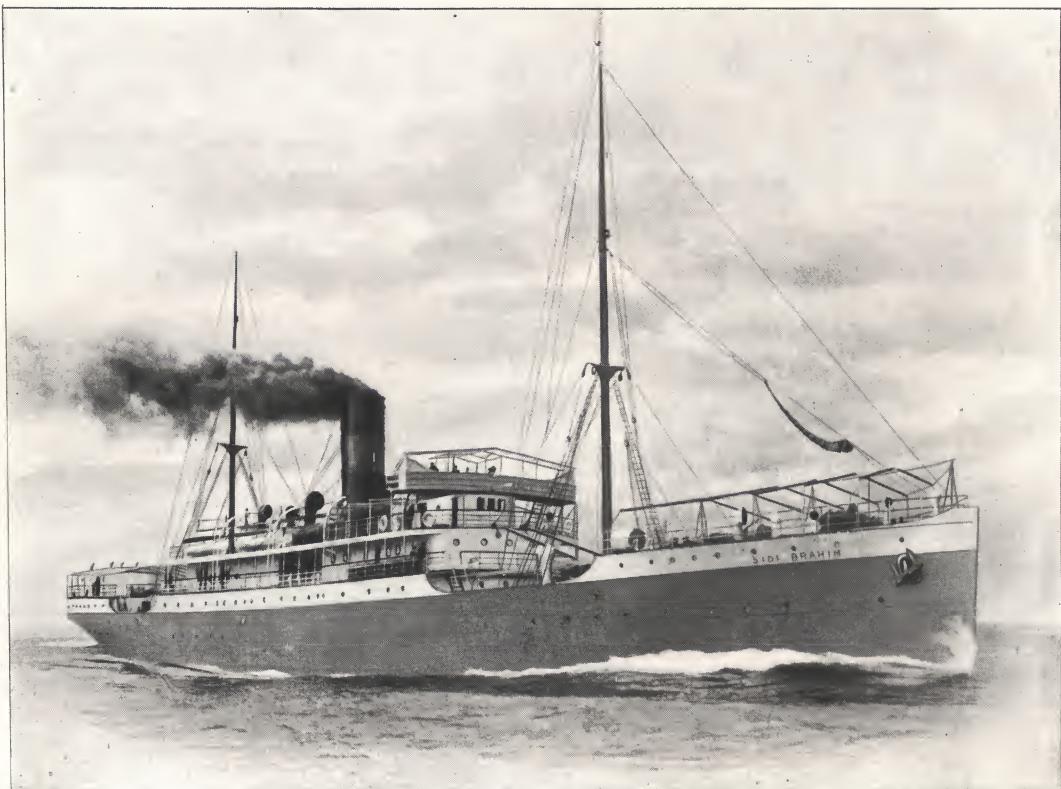


Photo by]

Mail Steamer "Sidi Brahim."

[Frank & Sons, So. Shields.

for service between France and Algeria. Accommodation is provided for 58 first-class passengers amidships, including two *de luxe* suites, together with dining saloon, smoking room, music room, and entrance hall. In the poop there are staterooms for 45 second-class passengers, with dining saloon and entrance house, and accommodation is arranged forward for 30 third-class passengers. An installation of wireless telegraphy is fitted,

Belgian ports. Accommodation for a limited number of passengers is provided. The triple expansion engines and two boilers were constructed by the ship-builders. Launched at Walker, 9th June.

CARGO steamer ; 230ft. long, by "Norhilda." 36 $\frac{1}{2}$ ft. ; 2,000 tons deadweight. Built for the Donald Steamship Co., Bristol and New York. The triple expansion

engines were constructed by the North Eastern Marine Engineering Co., Ltd., Wallsend. Trial trip, 9th June.

Tyne Iron Shipbuilding Co., Ltd., Willington Quay.

PASSENGER and cargo steamer, "Christopher." shelter-deck type; 375ft., by 50ft., by 33 $\frac{1}{4}$ ft. Built for the

Booth Steamship Co., Ltd., Liverpool. Accommodation is provided amidships under the bridge deck for first-class passengers, the dining saloon being on top of the bridge deck and the smoking room on top of the boat deck. Accommodation for second-class passengers is also provided in the poop. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 25, 40 and 68in., by 48in. stroke, with three boilers. On the trial trip, which took place on the 23rd April, a speed of 12 knots was attained.

CARGO steamer, single-deck type, "Leucadia." constructed on the Isherwood system of longitudinal framing; 360ft., by 50ft., by 25ft. 10in.;

6,400 tons deadweight. Built for the International Line Steamship Co., Ltd., Whitby. The triple expansion engines, by Messrs. John Dickinson & Sons, Ltd., Sunderland, have cylinders 24, 40 and 66in., by 45in. stroke, with two boilers. The vessel is the first of three of the same size and type building at the same shipyard. Launched, 8th June.

Wood, Skinner & Co., Limited, Bill Quay.

CARGO steamer, single-deck type "San Remo." Built for Mr. Otto Thoresen, Christiania. The triple expansion engines and two boilers fitted with Howden's forced draught were constructed by the North Eastern Marine Engineering Co., Ltd., Wallsend. Launched, 26th May.

COLLIER, long raised quarter-deck "Towneley." type. Built for the Burnett Steamship Co., Ltd., Newcastle. The triple expansion engines and two boilers were constructed by the North Eastern Marine Engineering Co., Ltd., Wallsend. Launched, 9th June.

THE WEAR.

S. P. Austin & Son, Limited, Sunderland.

COLLIER; 3,100 tons deadweight. "Sir Francis." The vessel is the twentieth ship built by Messrs. Austin for Messrs. William Cory & Son, Ltd., London. The propelling machinery was constructed by Messrs. George Clark, Ltd., Sunderland. Launched, 25th May.

Bartram & Sons, Sunderland.

CARGO steamer, shelter-deck type, "Cedar Branch." 412ft., by 51ft., by 32ft. Built to the order of the Nautilus Steam Shipping Co., Ltd. (Messrs. F. & W. Ritson), Sunderland, for their trade to the West Coast of South America. The triple expansion engines, by Messrs. John Dickinson & Sons, Ltd., Sunderland, have cylinders 28, 47 and 78in., by 51in. stroke, with three boilers. Launched, 21st June.

John Crown & Sons, Ltd., Sunderland.

CARGO steamer; 2,100 tons deadweight. "Solent." Built for the coasting and general trade. The propelling machinery was constructed by the North Eastern Marine Engineering Co., Ltd. Launched, 21st June.

Wm. Doxford & Sons, Ltd., Sunderland.

CARGO steamer, single-deck type, "Royal Crown." 378ft., by 51 $\frac{1}{2}$ ft., by 30 $\frac{1}{4}$ ft.; 8,000 tons deadweight. Built for the Royalist S.S. Co., Limited (Mr. J. L. Knott, advisory director), Newcastle. Launched, 27th May.

CARGO steamer, turret-deck type; "Atland." 390ft. long, by 52 $\frac{1}{2}$ ft. broad; 8,000 tons deadweight. Built to the order of Mr. Dan Broström, Gothenburg, for general trades, with a view to special work in iron ore in addition. The tri-compound engines were constructed by the shipbuilders. Trial trip, 15th June.

CARGO steamer, single-deck type; 360ft., by 50 $\frac{1}{4}$ ft., by 25 $\frac{1}{2}$ ft.; 6,800 tons deadweight. Built for Messrs. Giovanni Racich & Co., Ragusa. The triple expansion engines, constructed by the shipbuilders, have cylinders 26, 42 and 68in., by 42in. stroke, with two boilers. Launched, 21st June.

Osbourne, Graham & Co., Sunderland.

CARGO steamer; single-deck type; "Bogstad." 2,800 tons deadweight. Built for Messrs. Fearnley & Eger, Christiania. The propelling machinery was constructed

by Messrs. George Clark, Ltd., Sunderland. Launched, 24th June.

"Ladywood." CARGO steamer, built on the self-trimming principle; 300ft., by 43ft., by 21ft. 8in.; 3,500 tons deadweight. Built for Messrs. William France, Fenwick & Co., Ltd., Sunderland and London. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 22½, 37 and 61in., by 42in. stroke, with two boilers. Trial trip, 25th June.

Wm. Pickersgill & Sons, Ltd., Sunderland.

"West Quarter." SELF-TRIMMING collier, well-deck type; 254ft., by 36½ft., by 18ft. 10¼in. Built for Messrs. John Ridley, Son and Tully, Newcastle. The triple expansion engines and two boilers were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Launched, 26th May.

John Priestman & Co., Sunderland.

"Eastern Prince." CARGO steamer, shelter-deck type; 353ft., by 46½ft., by 31ft. 8½in. Built for the Prince Line, Limited, Newcastle. Accommodation for a limited number of passengers is arranged in a large deckhouse on the shelter deck. The triple expansion engines, by Messrs. George Clark, Ltd., Sunderland, have cylinders 25, 42 and 69in., by 45in. stroke, with two boilers working under Howden's forced draught. Trial trip, 28th April.

"Asiatic Prince." CARGO steamer. The vessel is a sister ship to the *Eastern Prince*, and was built for the same owners. Trial trip, 16th June.

Short Brothers, Limited, Sunderland.

"Octo." CARGO steamer, built on the self-trimming principle; 269ft., by 37½ft., by 20ft. 4in.; 2,750 tons deadweight. Built for the Aktieselskabet Hekla, Christiania. The triple expansion engines and one boiler were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 18th April.

"Terno." CARGO steamer, built on the self-trimming principle; 269ft., by 37½ft., by 20ft. 4in.; 2,750 tons deadweight. Built for Messrs. Ch. Th. Roe & Son, Arendal. The triple expansion engines and one boiler were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 27th April.

"Anglo-Patagonian." CARGO steamer, shelter-deck type; 420ft., by 52ft. 4in., by 29ft. 1½in.; 8,500 tons deadweight. The vessel was constructed on the Isherwood system of longitudinal framing, and is the largest vessel yet constructed in this country on that system. Built for the Nitrate Producers' Steam Shipping Co., Ltd. (Messrs. Lawther, Latta and Co., managers), London. Four staterooms are provided on the shelter deck for passengers. The quadruple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 24, 34½, 49 and 71in., by 48in. stroke, with three boilers working under Howden's forced draught. Launched, 25th May.

Sunderland Shipbuilding Co., Ltd.

"Saskatoon." CARGO steamer, single-deck type; 250ft., by 48¾ft., by 18½ft. Built to the order of the Colonial Transportation Co., Ltd., Toronto, for service on the Canadian Great Lakes. The triple expansion engines and two boilers, placed aft, were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 19th April.

"Malmanger." CARGO steamer, raised quarter-deck type; 235ft., by 37½ft., by 17ft. 8in.; 2,300 tons deadweight. Built for Mr. H. Westfal Larsen, Bergen. The triple expansion engines and two boilers were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 27th April.

"Oakmere." CARGO steamer, shelter-deck type; 245ft., by 36ft., by 18½ft.; 2,200 tons deadweight. Built to the order of the Watson Steamship Co., Ltd., Manchester, for their Manchester and Mediterranean fruit trade. Accommodation is provided on the top of the shelter deck for a few passengers. The triple expansion engines and one boiler were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Launched, 8th June.

Joseph L. Thompson & Sons, Ltd., Sunderland.

"Lincluden." CARGO steamer. Built for the Lincluden S.S. Co. (Messrs. Sivewright, Bacon and Co.), Manchester. The propelling machinery was constructed by Messrs. John Dickinson & Sons, Ltd., Sunderland. Trial trip, 18th June.

"Boyne." CARGO steamer; 388ft., by 51½ft., by 28¾ft. Built for the Mercantile Steamship Co., Ltd., London. The triple expansion engines, by Messrs. Blair

and Co., Ltd., Stockton, have cylinders 25, 42 and 68in., by 48in. stroke, with two boilers. Launched, 18th June.

Robt. Thompson & Sons, Ltd., Sunderland.

"Remembrance." CARGO steamer, single-deck type; 346 $\frac{1}{2}$ ft., by 50ft. 10in., by 25 $\frac{1}{2}$ ft. Built for the Freear and Dix Steam Shipping Co., Ltd., Sunderland. The triple expansion engines, by

Messrs. George Clark, Ltd., Sunderland, have cylinders 25, 41 and 67in., by 45in. stroke. Trial trip, 9th June.

CARGO steamer, partial awning-deck type; 225ft., by 35ft., by 16 $\frac{1}{2}$ ft. Built for the Dampfschiffahrts-Gesellschaft "Neptun," Bremen. The triple expansion engines and one boiler were constructed by Messrs. MacColl and Pollock, Ltd., Sunderland. Trial trip, 10th June.

TEES AND HARTLEPOOL.

Craig, Taylor & Co., Ltd., Thornaby.

CARGO steamer; 7,000 tons dead-weight. Built for Messrs. Joseph Hoult & Co., Ltd., Liverpool.

The triple expansion engines were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 16th April.

"Eggesford." CARGO steamer, single-deck type; 373ft., by 51ft., by 23 $\frac{1}{2}$ ft. Built for Messrs. W.

J. Tatem & Co., Cardiff. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 25, 42 and 68in., by 45in. stroke, with two boilers. Launched, 6th May.

"Bideford." CARGO steamer. The vessel is a sister ship to the *Eggesford*, and was built for the same owners. Launched, 24th May.

"Thistleban." CARGO steamer, single-deck type; 382ft., by 51ft. 41in., by 26 $\frac{1}{2}$ ft. Built for the Albyn Line, Ltd. (Messrs. Allan, Black & Co.), Sunderland. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, have cylinders 26, 42 $\frac{1}{2}$ and 69 $\frac{1}{2}$ in., by 45in. stroke, with two boilers. Launched, 25th June.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

"Kwarra." CARGO steamer, shelter-deck type, constructed on the builders' cantilever-frame system, with topside water-ballast tanks; 373 $\frac{1}{2}$ ft., by 52ft., by 28ft. 8in.; 8,100 tons deadweight. Built for Messrs. Elder, Dempster & Co., Liverpool. A large steel house on the shelter deck amidships contains comfortable accommodation for 12 passengers. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 26, 42 and 70in., by 48in. stroke,

with three boilers working under Howden's forced draught. Launched, 30th May.

CARGO steamer, single-deck type; 378ft., by 51ft., by 28 $\frac{1}{2}$ ft.; 7,400 tons deadweight. Built for the Empire Transport Co., Ltd., London. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Middlesbrough, have cylinders 25, 40 and 67in., by 45in. stroke, with three boilers. Trial trip, 2nd June.

"Canadian Transport." CARGO steamer; 377 $\frac{1}{2}$ ft., by 51ft. 2in., by 28ft. 4 $\frac{1}{2}$ in.; 7,400 tons deadweight. Built for the Empire Transport Co., Ltd., London. Launched, 23rd June.

CARGO steamer, constructed on the builders' cantilever-frame system, with topside water-ballast tanks; 4,000 tons deadweight. Built to the order of Mr. Luis de Ocharan, Bilbao, for the iron ore trade. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, have cylinders 22, 36 and 59in., by 39in. stroke, with two boilers. Trial trip, 24th June.

Wm. Gray & Co., Ltd., West Hartlepool.

CARGO steamer; 362ft., by 50ft., by 25ft. 11 $\frac{1}{2}$ in. Built to the order of Messrs. Frank C. Strick and Co., Ltd., London and Swansea, for the Tunisienne Steam Navigation Co., Paris. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 24, 38 and 64in., by 42in. stroke, with two boilers working under Howden's forced draught. Launched, 8th April.

CARGO steamer, two-deck type; 362ft., by 46 $\frac{1}{2}$ ft., by 24 $\frac{3}{4}$ ft. Built for Messrs. Frank C.

Strick & Co., Ltd., Swansea and London. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 25, 40 and 65in., by 42in. stroke, with two boilers working under Howden's forced draught. Launched, 9th May.

Camerata. CARGO steamer. The vessel is a sister ship to the *Djerissa*, and was built for the same owners. Launched, 9th May.

Boukadra. CARGO steamer. The vessel is a sister ship to the *Djerissa* and *Camerata*, and was built for the same owners. Launched, 10th June.

Harpagus. CARGO steamer; 441ft., by 53 $\frac{1}{2}$ ft., by 31ft. 8in. Built to the order of Messrs. J. & C. Harrison, Ltd., London, for the Eastern trade. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 28, 45 and 75in., by 51in. stroke, with four boilers working under Howden's forced draught. Trial trip, 11th June.

Baltistan. CARGO steamer, two-deck type. The vessel is a sister ship to the *Registan*, and was built for the same owners. Trial trip, 17th June.

Fridland. SIDE ballast tank self-trimming cargo steamer; 415ft., by 52 $\frac{3}{4}$ ft. by 28 $\frac{1}{2}$ ft. Built to the order of Messrs. Axel Broström & Son, Gothenburg, for the Swedish iron ore and general trade. The vessel has altogether capacity for 3,100 tons of water ballast. The side ballast tanks extend from the after hold to the fore hold, a length of 247ft., in way of which the ship has double sides. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 27 $\frac{1}{2}$, 43 and 73in., by 48in. stroke, with two boilers working under Howden's forced draught. Launched, 23rd June.

Joseph Chamberlain. CARGO steamer; 361 $\frac{1}{2}$ ft., by 50ft., by 25ft. 11in.

Built for Messrs. J. & R. O. Sanderson & Co., West Hartlepool and Cardiff. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 25, 40 $\frac{1}{2}$ and 67in., by 45in. stroke, with two boilers. Launched, 24th June.

W. Harkess & Son, Ltd., Middlesbrough.

Hopeful. CARGO steamer; 195ft. long. Built for the British and Continental Steamship Co., Ltd.,

Liverpool. The triple expansion engines and two boilers were constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough. Trial trip, 23rd April.

Teeswood. CARGO steamer; 145ft., by 24ft. 1 $\frac{1}{2}$ in., by 11ft. 7in.; 500 tons deadweight. Built to the order of the Meteor Steamship Co., Ltd., Middlesbrough, for the coasting trade. The propelling machinery was constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough. Launched, 22nd June.

Irvine's Shipbldg. & Dry Dock Co., Hartlepool.

Graanhandel. CARGO steamer, single-deck type; 289 $\frac{1}{2}$ ft., by 40ft. 2in.; by 20ft. 6 $\frac{1}{2}$ in. Built to the order of Messrs. Furness, Withy and Co., Ltd., for the Scheepsvaart Maatschappij "Gylsen," Antwerp. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, have cylinders 20 $\frac{1}{2}$, 33 and 54in., by 36in. stroke, with two boilers. Trial trip, 11th April.

Tamele. PASSENGER and cargo steamer, with main, upper, and shelter decks; 375ft., by 50ft., by 25 $\frac{1}{4}$ ft. Built to the order of Messrs. Elder, Dempster and Co., Liverpool, for their West African trade. Accommodation for 30 first-class passengers, in two-berth staterooms, is arranged under the bridge. The second-class accommodation is at the after end, under the poop. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, have cylinders 25, 40 and 68in., by 48in. stroke, with three boilers. Trial trip, 30th April.

Akassa. PASSENGER and cargo steamer. The vessel is a sister ship to the *Tamele*, and was built for the same owners. Launched at the Middleton Shipyard, 9th May.

Stephen Furness. PASSENGER and cargo steamer; 305ft. long. Built to the order of the Tyne-Tees Steam Shipping Co., Ltd., Newcastle, for their Tyne to London trade. The vessel has a long full poop, with a well forward, topgallant forecastle, and a complete shelter deck all fore and aft. Accommodation is provided for about 250 first and 120 second-class passengers. The first-class dining saloon is in a large deckhouse on top of the shelter deck at the fore end of the boiler casing. The seating is arranged in bays all round, with small tables to seat not more than four passengers, and the centre tables are of

similar size. At the after end of the saloon, the main staircase leads below to the first-class staterooms. The first-class smoking room is situated in a large house at the after end of the engine room, on the same deck level. A promenade deck is erected overhead, and extends for a distance of about 150ft. amidships. A large number of the first-class staterooms are arranged for two passengers, and, in addition, there is a number of special staterooms amidships on the promenade deck. The second-class accommodation is placed under the shelter deck aft, extending from stern to engine-room bulkhead. The triple expansion engines, by Messrs. Richardson, Westgarth and Co., Ltd., Hartlepool, have cylinders 26, 42 and 72in., by 48in. stroke, with three boilers working under Howden's forced draught. Launched at the Harbour Dockyard, 10th May.

"Onitscha." PASSENGER and cargo steamer. The vessel is a sister ship to the *Tamele* and *Akassa*, and was built for the same owners. Trial trip, 2nd June.

Richardson, Duck & Co., Stockton.

"Seawall." CARGO steamer, single-deck type ; 336ft., by 47ft., by 24ft. 10in. ; 3,050 gross tonnage. Built for the Mawson Shipping Co., Ltd. (Messrs. Arthur Mawson & Co.), Cardiff. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, have cylinders 23½, 39 and 64in., by 42in. stroke, with two boilers. Launched, 23rd April.

"Rotherhill." COLLIER, single-deck type ; 313½ft., by 42½ft., by 22ft. 5½in. Built to the order of Messrs. W. J. Tillett & Co., Cardiff, to meet the Admiralty requirements for fleet colliers. The triple expansion engines, by Messrs. Blair and Co., Ltd., Stockton, have cylinders 22½, 37 and 61in., by 42in. stroke, with two boilers. Launched, 24th May.

"Bampton." CARGO steamer, single-deck type ; 393½ft., by 50ft., by 28ft. 11in. ; 7,500 tons deadweight. Built for

the Tatem Steam Navigation Co., Ltd., Cardiff. The triple expansion engines, by Messrs. Blair and Co., Ltd., Stockton, have cylinders 25, 42 and 68in., by 45in. stroke, with two boilers working under Howden's forced draught. Launched, 23rd June.

Ropner & Sons, Ltd., Stockton.

"Spilsby." CARGO steamer ; 358½ft., by 50ft. 10in., by 25ft. 8in. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, indicate about 1,500 H.P., taking steam from two boilers. Launched, 11th April.

"Mordenwood." CARGO steamer ; 342½ft., by 47ft., by 24¾ft. Built for the Constantine and Pickering Steamship Co., Middlesbrough. The triple expansion engines, by Messrs. Blair and Co., Ltd., Stockton, indicate about 1,300 H.P., taking steam from two boilers. Launched, 9th May.

Smith's Dock Co., Ltd., South Bank.

"Priestman." GRAB hopper dredger ; 122ft., by 26ft., by 11½ft. ; 375 tons deadweight. Built for Mr. C. H. Campbell, dredging contractor, London. The hopper is loaded by a heavy type of Priestman grab dredging crane, having spare grabs for the different types of material that the vessel may be called upon to dredge. The dredger is fitted with a return-tube boiler and other details to equip her for rapid handling in restricted waters. Trials, 12th April.

—. Six finely modelled steel screw drifters. Launched, 25th April.

—. Two finely modelled steel screw drifters. Launched, 25th May.

—. TWIN-SCREW steel grain barge. Launched, 10th June.

OTHER ENGLISH CENTRES.

Cammell, Laird & Co., Limited.

"Cæsarea." TRIPLE-SCREW turbine cross-channel steamer ; 284ft., by 39ft., by 16½ft. Built to the order of the London & South Western Railway Co., for their Channel Islands traffic. Accom-

modation is provided for 186 first and 114 second-class passengers. The propelling machinery consists of a set of Parsons steam turbines driving three shafts and two double-ended boilers, designed to give the vessel a speed of 20 knots on service. Launched, 26th May.

"Snaefell."

TWIN-SCREW passenger steamer; 270ft., by 41 $\frac{1}{2}$ ft., by 24 $\frac{1}{4}$ ft. depth moulded to shelter deck.

Built to the order of the Isle of Man Steam Packet Co., for their winter passenger traffic between Liverpool and the Isle of Man. The vessel has a complete shelter deck, with promenade deck and boat deck amidships, for the use of first-class passengers. The promenade deck for second-class passengers is provided over the deckhouse aft. The first-class dining saloon is situated above the shelter deck, one of the features being the alcoves, fitted on each side, with small party tables for diners during the heavy traffic in

"Bluebell."

TWIN-SCREW ferry steamer; 160ft., by 38 $\frac{1}{2}$ ft., by 11 $\frac{1}{4}$ ft. The vessel is the first of two building by Messrs. Cammell, Laird & Co. for the Wallasey Urban District Council, and is designed to carry about 1,400 passengers. The whole of the machinery is placed under the main deck, thus providing large saloon accommodation. A small saloon is also arranged in the after part of the after main saloon for the exclusive use of ladies. The two sets of triple expansion engines, constructed by the shipbuilders, have cylinders 16, 24 and 41in., by 21in. stroke, with two boilers. Launched at Birkenhead, 23rd June.



T.S.S. "Snaefell" in Graving Dock.

summer. These alcoves can be converted into staterooms in winter. On the promenade deck there is a ladies' cabin, and further aft, on the same deck, there are four handsomely designed staterooms. The smoking room is also a strikingly designed apartment. The principal portion of the sleeping accommodation for first class passengers is on the lower deck, forward of the boiler space, and there is provision for a large number of berths. The second-class accommodation is fitted up aft, with a ladies' cabin above. The propelling machinery consists of two sets of triple expansion engines with four cylinders balanced on the Yarrow, Schlick and Tweedy system, steam being supplied by four single-ended boilers working under forced draught on the closed stokehold system. Trial trip, 14th June.

Cochrane & Sons, Selby.**"Golden Ring."**

SCREW drifter; 83ft. long. Built for Mr. W. T. Tripp, Lowestoft. The compound engines were constructed by Messrs. Crabtree and Co., Ltd., Great Yarmouth. Launched, 12th April.

"Incentive."

SCREW drifter; 83ft. long. Built for Messrs. C. and R. Harvey, Ltd., Lowestoft. The compound engines were constructed by Messrs. Crabtree & Co., Ltd., Great Yarmouth. Launched, 12th April.

"Manx Prince."

SCREW trawler; 117 $\frac{1}{2}$ ft. long. Built for Mr. W. H. Beeley, Grimsby. The

triple expansion engines were constructed by Messrs. C. D. Holmes and Co., Ltd., Hull. Launched, 11th May.

"Supernal." SCREW drifter; 83ft. long. Built for Mr. Thacker, Lowestoft. The compound engines were constructed by Messrs. Crabtree & Co., Ltd., Great Yarmouth. Launched, 11th May.

"Wishful." SCREW drifter; 83ft. long. Built for the Eastern Drifters Co., Ltd., Lowestoft. The compound engines were constructed by Messrs. Crabtree and Co., Ltd., Great Yarmouth. Launched, 25th May.

— SCREW trawler; 120ft. long. Built for the Great Central Co-operative Engineering and Ship-repairing Co., Ltd., Grimsby, who constructed the triple expansion engines. Launched, 8th June.

— SCREW trawler; 120ft. long. Built to the order of the Great Central Co-operative Engineering & Ship Repairing Co., Ltd., Grimsby, who constructed the triple expansion engines. Launched, 25th June.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

"Eskimo." TWIN-SCREW passenger steamer, three-deck type; 330ft., by 45ft., by 27½ft. Built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., Hull, for service between Hull and Christiania. Accommodation is provided for 150 first, 50 second, and 500 third-class passengers. The staterooms for first and second-class passengers are situated on the upper and main decks amidships, and are mainly single and double-berth cabins. The saloons are on the main deck. The first-class lounge is on the lower promenade deck, from which a grand staircase leads direct to the staterooms and saloon. The first-class smoking room is also on this deck. The third-class accommodation is at the forward and after ends of the vessel on the main and lower decks, and consists of four and six-berth cabins. Three large dining and recreation rooms are provided for third-class passengers. A system of wireless telegraphy is installed. The two sets of quadruple expansion engines have cylinders 20, 28, 39½ and 57in., by 33in. stroke, with four boilers working under forced draught. The propelling machinery indicates 5,000 horse-power at sea. Launched, 9th April.

"Dewsbury." PASSENGER and cargo steamer, single-deck type; 265ft., by 36ft., by 18½ft. Built to the order of the Great Central Railway Company,

for service between Grimsby and Hamburg. Accommodation is provided for about 100 first-class passengers in a house on the bridge deck, with several four-berth cabins on the main deck. A special stateroom, of large dimensions, is provided on the main deck amidships. Rooms for about 10 second-class passengers are arranged under the poop; 300 third-class passengers are provided for in the forward and after 'tween decks. The triple expansion engines have cylinders 22, 35 and 60in., by 42in. stroke, taking steam from two boilers, and indicating about 2,000 horse-power. Launched, 14th April.

H.M.S. "Hellespont." SEA-GOING paddle tug; 145ft., by 53ft. 4in. breadth over paddle boxes, by 15ft. 11in. Built for the British Admiralty. The towing arrangements are such that the vessel can tow either ahead or alongside of the largest battleships or cruisers. Large fire pumps are fitted on both sides of the tug, worked by steam and hand power, and connected with numerous long lengths of hose pipe. Salvage pumps are provided, capable of pumping out and raising sunken warships. Large rooms have also been built in the holds for the reception of the gear and stores. The propelling machinery consists of double compound diagonal paddle engines, with disconnecting shaft so arranged that the paddle wheels can revolve in opposite directions to enable the vessel to turn in a limited space. Steam is supplied by two boilers. The vessel was launched with engines and boilers on board ready for trial. Launched, 10th May.

"Normandy." PASSENGER and cargo steamer, single-deck type; 192ft., by 29ft., by 15ft. Built to the order of the London, Brighton & South Coast Railway Co., for service between Newhaven and Caen. Accommodation is provided for passengers under the bridge, a large dining saloon and ladies' cabin being fitted at the forward end. The vessel is equipped with a refrigerating installation, the main hold being insulated. The triple expansion engines have cylinders 15½, 25 and 40in., by 27in. stroke, with two boilers. Launched, 12th May.

"Aeerington." PASSENGER and cargo steamer. The vessel is a sister ship to the *Dewsbury*, and was built for the same owners. Launched, 7th June.

Goole Shipbuilding & Repairing Co., Ltd., Goole. CARGO steamer; 145ft., by 24ft., by 11ft. 10in.; 500 tons dead-weight. Built for Mr. E. P.

Hutchinson, Hull. The propelling machinery consists of triple expansion engines. Launched, 22nd June.

Vickers, Sons & Maxim, Ltd., Barrow.

BRAZILIAN battleship. The trials of this vessel, which took place in May, are fully dealt with elsewhere in the present issue.

Floating Dock. DOUBLE-SIDED self-docking floating dock. Built to the order of the Brazilian Government, for lifting the battleships

outer bottom of 63ft. 4in. The lifting capacity of the dock is 22,500 tons, and it can take a battleship of practically any length with a beam up to 100ft. The dock is of the Clark and Standfield design and is self-docking, *i.e.*, any of the sections can be unbolted and lifted on the others for overhaul and painting. It is extensively subdivided, but the flooding or pumping out of the compartments is operated from one central valve house situated in the starboard wall. The Westinghouse electro-pneumatic system is adopted for operating the valves, and there is an indicator to show the level of the water in each compartment. There are three



Floating Dock for Brazilian Government.

built and building in this country for that Power. The structure will serve the purpose of a much more expensive graving dock at Rio de Janeiro, to which port it is being towed, and it has been built in a fifth or a sixth of the time that would have been required to construct a masonry dock. The new floating dock has a length overall of 550ft. 6in. and a width overall of 136ft. The depth between the double bottoms is 18ft. 4in., and the side walls have a total height from the

powerful pumps in each wall, connected to two continuous main drains extending the whole length of the dock, and any one of these pumps can be used alone to empty its own half of the dock. The boilers, engines, and dynamos are placed on a 'tween deck 20ft. below the top deck. There are seven boilers, six steam pumps for fire and wash-down service, and two dynamos for lighting the vessel to be docked and supplying current to work the fans, motors, etc. A

distilling plant has been provided to supply fresh water for 750 officers and men, and cooking and sanitary arrangements, electric ventilating fans, etc., have also been installed. A gangway at one end of the dock connects the two walls, and two travelling steam cranes, each capable of lifting five tons, have been fitted one on each wall. The three sections were launched on the 7th, 8th and 9th June, and bolted together at a special berth at Ramsden Dock in the Walney Channel. The floating dock will be towed from Barrow to Rio de Janeiro by two of Messrs. L. Smit & Co.'s most powerful tugs, the *Zwartezee* and *Roodezee*. Given fine weather, it is

and had to be stopped when about two-thirds of the trial had been completed. This necessitated a further trial, which was entirely satisfactory. The full-power speed according to the contract was 25 knots, with 22,000 H.P., but the cruiser was able to exceed this by 1·17 knots, attaining 26·17 knots and developing 24,700 shaft horsepower. The tests with the two 6-inch and the 4·7-inch guns also proved successful. The trials demonstrated that the vessel possessed excellent seagoing qualities—an important consideration with a ship of such high speed. The *Liverpool*, which was launched on the 30th October and has been completed within 16 months from the date



H.M. Protected Cruiser "Liverpool."

expected that the journey of between 5,000 and 6,000 miles will be accomplished in about seven weeks.

H.M.S. "Liverpool."

SECOND-CLASS protected cruiser of the "Town" class; 453ft.

overall, by 47ft.; 4,800 tons displacement. The vessel was described at length in a recent issue of *The Shipbuilder*.* The trials took place on the Clyde during the week ending 18th June, and were attended with great success. During the 30 hours' trial the vessel ran into heavy fog

of the laying of the keel, is the first to complete her trials of the five cruisers of this type ordered by the British Admiralty in November, 1908.

J. Samuel White & Co., Ltd., East Cowes.

H.M.S. "Redpole." OCEAN-GOING torpedo-boat destroyer; 240ft. long. The vessel is the

first of three ordered by the Admiralty from Messrs. White last year. The propelling machinery consists of Parsons turbines, with patent White-Forster boilers arranged to burn oil fuel, and will give the vessel a speed of 27 knots. Launched, 24th June.

* Pages 172 and 184, No. 15, Vol. IV.

FOREIGN CENTRES.

Antwerp Engineering Co., Hoboken, Antwerp.

CARGO steamer; 250ft., by "Cingetorix." 37ft., by 17ft. 11in.; 2,300 tons deadweight. Built for Messrs. J. D'Haene & Co., Antwerp. The triple expansion engines develop 850 H.P., giving a speed of $9\frac{1}{4}$ knots fully loaded. Trial trip, 11th June.

Societe Anonyme John Cockerill, Hoboken, Antwerp.

TRIPLE-SCREW turbine cross-channel steamer. Built to "Jan Breydel." the order of the Belgian State Railways for the mail and passenger service between Dover and Ostend. The official trials took place on the Clyde early in April. For the endurance trial four runs were made between the Cloch and Cumbrae lightships about $13\frac{2}{3}$ miles apart, two with the tide and two against, and the mean speed attained was 24.3 knots, or three-tenths of a knot in excess of the contract speed. On the measured mile two runs were made at full speed, one with and one against the tide, the mean speed being 24.83 knots. At full speed astern the vessel showed herself capable of 16 knots. Returning from the Clyde to Antwerp, the *Jan Breydel* encountered a severe gale, but behaved splendidly. On her first trip from Ostend to Dover and back, a hurricane was blowing, but the distance from Ostend to Dover was accomplished in three hours six minutes and from Dover to Ostend in three hours four minutes, the mean speed being $24\frac{1}{2}$ knots. This performance has been unequalled on any other Anglo-Continental route. The greatest credit for this splendid vessel and for her sister, the *Pieter de Coninck*, is due to M. Pierrard, the Director of

Marine in Belgium, who also prepared the plans of the earlier *Princesse Elisabeth*. The *Jan Breydel* and the *Pieter de Coninck* are generally similar to the *Princesse Elisabeth*, but slightly larger and improved, Captain Gustave Dubois, the commander of the latter vessel, suggesting the improvements carried out.

"Pieter de Coninck." TRIPLE-SCREW turbine cross-channel steamer.

The vessel is a sister ship to the *Jan Breydel*, and was built for the same service. Her trials were carried out in the North Sea on the 16th June, and resulted in the averages of the *Jan Breydel* being maintained. On the stopping trials, it was ascertained that at 20 knots the vessel could be pulled up at 330 metres in 74 seconds, at 16 knots at 200 metres in 61 seconds, and at 10 knots at 95 metres in 32 seconds, which are practically the same results as obtained on the trial of the sister ship. The morning and afternoon service from Dover and the morning and night service from Ostend are now exclusively maintained by the *Jan Breydel* and *Pieter de Coninck*, the largest and fastest vessels plying between England and the Continent. The night service from Dover and the afternoon service from Ostend are being taken by the *Marie Henriette* and *Princesse Clementine*, the 22.2-knot and 22.188-knot paddle boats (the fastest in the world) built by Messrs. Cockerill in 1893 and 1897.

Lazevaags Eng. & Shipbuilding Co., Bergen.

CARGO steamer; $239\frac{1}{2}$ ft., by "Modena." 35ft., by 16ft. 10in. Built for Mr. Ivar An. Christensen, Hauge-sund. The triple expansion engines, constructed by the shipbuilders, have cylinders 16, $25\frac{1}{2}$ and 43in., by 30in. stroke. Launched, 12th April.



THE various ship-repairing departments of Smith's Dock Company at North and South Shields and at Middlesbrough have been well employed during the last three months. Their most prominent contract was the repairs to the Russian emigrant steamer *Lituania*. In addition, they have had through their hands the *Oriflamme*, *Ellida*, *Sicilian Prince*, *Chingford*, *Jeanne*, *Lovaine*, *Dalton*, *Beatrice*, *Vanadis*, *Lumen*, *Goldmouth*, *Broadmayne*, *Romany*, etc. At Middlesbrough the company have docked vessels for the Nippon Yusen Kaisha, the P. & O. Company, the Royal Mail Company, Messrs. Brocklebank, the East Asiatic Company, etc.

MESSRS. Henry Bucknall & Sons, Ltd., 22, Crutched Friars, London, and Lisbon, have taken over the business of Mr. John L. Wilson, granulated cork manufacturer, 278, Shields Road, Glasgow, and Caramujo, Portugal. The trade in granulated cork for insulation is steadily increasing owing to the superior insulating results it gives and to its cleanliness and lightness. This latter quality is especially valuable to ship-owners. We understand that Messrs. Henry Bucknall & Sons, Ltd., will greatly increase the output of granulated cork so as to meet every demand for prompt delivery.

Reviews.

The Design of Structures. Fifth Edition (revised).

By S. Anglin, C.E. Price 16/- net. (London: Charles Griffin & Co., Ltd., Exeter Street, Strand.)

Mr. Anglin's book is so well known and is in such general use, both among students and as a reference work among professional engineers, that it is unnecessary to review it here in detail. It suffices to say that a continued demand has led to the publication of a fifth edition, in which the opportunity has been taken of making a few necessary corrections and of bringing the subject matter up to date.

Ship Construction and Calculations. By George Nicol, M.I.N.A. Price 10/6 net. (Glasgow: James Brown & Son, 52-56, Darnley Street, Pollokshields, E.)

This work, consisting of 350 pages, may be described as a manual explaining in popular language the latest practice in mercantile ship construction and the calculations which have to be made in the shipyard drawing office. Special prominence is given to the fundamental aspects of technical design, strength, form, and stability; chapters are devoted to rolling, loading, ballasting, etc.; and the various types of cargo steamers and the practical details of their construction receive attention. The appendices contain valuable information on the proof of formulæ and co-efficients of form, together with various tables of weights, etc. A praiseworthy feature of the book is the large number of practical examples given throughout the text and at the end of the volume. While written primarily for officers of the mercantile marine and ship superintendents, the work should appeal strongly to shipyard workers—especially draughtsmen and foremen—and indeed to all to whom a more or less intimate knowledge of naval architecture is essential. The author's service as a surveyor to Lloyd's Register of Shipping places him in a position to know exactly the present-day requirements of those engaged in the shipbuilding industry, and it goes without saying, therefore, that he has produced a book up-to-date in every respect, Lloyd's new rules being used throughout.

Know Your Own Ship. Eleventh Edition. By Thomas Walton, Naval Architect. Price 7/6. (London: Charles Griffin & Co., Ltd., Exeter Street, Strand.)

Having felt the necessity of keeping this work up to date, the author has carefully revised the eleventh edition before presenting it to the

public. Although specially arranged for the use of ships' officers, superintendents, engineers, and draughtsmen, "Know Your Own Ship" in its new form will be found a very useful work of reference to apprentices and others engaged in the study of naval architecture, written as it is in the clear and concise style which characterises Mr. Walton's two other well-known books, "Steel Ships" and "Present-day Shipbuilding." The structure of a ship, the stresses brought to bear upon the structure, and the arrangements to prevent strain are fully explained and dealt with. The subject of stability, including rolling, ballasting, loading with homogeneous and shifting cargoes, the effect of the admission of water into the interior of a ship, etc., occupies one chapter of considerable length; information being also given in regard to trim, with practical examples showing how a change of trim is ascertained. This section, it may be remarked, was originally published in the form of a paper read before the Shipmasters' Society in London. Owing to the numerous modifications introduced during recent years, the chapter devoted to tonnage has undergone revision, and has been considerably enlarged. Freeboard, too, is fully explained, well illustrated, and adapted to the latest Board of Trade Regulations. A special feature of the volume is the complete set of ship calculations, worked from actual drawings given. Notes and explanations accompany each calculation, and no reader, however elementary his mathematical knowledge, will be prevented from intelligently following the steps in the processes involved. In Appendix A. the reader's attention is called to an able paper read before the Institute of Marine Engineers by Mr. John A. Rowe, now Chief Examiner of Engineers to the Board of Trade, on "Dynamic Stability and Oscillations among Waves"; while Appendix B. is occupied with many test questions for the use of students.

Other Books received.

Transactions of the North-East Coast Institution of Engineers and Shipbuilders, Parts 4, 5, 6 and 7, Vol. XXVI., 1909-10. "Fighting Ships, 1910," edited by Fred T. Jane; Sampson Low, Marston & Co., Overy House, 100, Southwark Street, London, S.E.; 21/- net. "Technische Hydromechanik" (Technical Hydromechanics), by Dr. Hans Lorenz; R. Oldenbourg, Munich; 14/6 net. "Hydrographic Surveying: A Practical Handbook for Beginners, Seamen, and Others" (with 262 figures and 22 plates), by Commander Stuart V. S. C. Messum; Charles Griffin & Co., Exeter Street, Strand,

London, W.C.; 12/- net. "The Lightkeeper," No. 4, Vol. III.; Lighthouse Literature Mission, 20, Bedford Street, Belfast; 1/3. "The Journal of the North-East Coast Association of Secretaries," No. 9, Vol. II.; Andrew Reid & Co., Newcastle-on-Tyne; 1/-.

We shall be pleased to supply to readers any of the books referred to above at the prices mentioned, but the cost of postage should be added when the prices named are net. Remittances should be sent to the Publishers of "The Shipbuilder," Newcastle-on-Tyne.

New Catalogues, etc., received.

Mr. Thomas E. Curtis, 5, Victoria Mansions, Grange Road, Willesden Green, London, N.W., European agent for the Hanchett Swage Works, Big Rapids, Michigan, U.S.A., has favoured us with a copy of their latest catalogue illustrating and describing the most improved types of machines and tools for the equipment of the filing rooms attached to sawmills and wood-working establishments generally.

Messrs. John Dugdill & Co., Failsworth, near Manchester, have sent us a copy of the third edition of their illustrated catalogue of movable and extensible fittings, and textile, electrical, and airship accessories.

The Electric & Ordnance Accessories Co., Ltd., Cheston Road, Aston, Birmingham, have sent us a copy of their current catalogue dealing with small ventilating fans for desks, walls, ceilings, port holes, etc.

The Great Central Railway Co. have sent us a pamphlet descriptive of the railway arrangements in connection with the new Immingham Dock. Copies of the pamphlet may be obtained on application to the company's Publicity Dept., 216, Marylebone Road, London, N.W.

Messrs. J. H. Holmes & Co., Portland Road, Newcastle-on-Tyne, have sent us a newly issued list of their continuous-current "Castle" motors and dynamos.

Messrs. Thomas Parsons & Sons, 8, Endell Street, Long Acre, London, W.C., the well-known varnish and japan manufacturers, have sent us a copy of the second edition of their book "Ornamental Decoration." The work, which has been compiled by Mr. F. Scott Mitchell, is beautifully illustrated in colours. To those in search of something new and different from the somewhat hackneyed scheme of decoration usually followed in the public rooms of passenger vessels, the designs of Messrs. Parsons for painters' and decorators' work should prove very suggestive.



MESSRS. Sidgwick & Jackson announce for immediate publication the companion volume to their "Sailing Ships and Their Story," which was reviewed in the last issue of "The Shipbuilder." This is "Steamships and Their Story," by Mr. R. A. Fletcher, the well-known expert in his subject, who has spent many years collecting material for his book. The illustrations will be on an even more lavish scale than the previous volume.

IN the Transportation Section of Building No. 48 at the Japan-British Exhibition is the stand of Messrs. Wailes, Dove & Co., Newcastle, the patentees and sole manufacturers of the well-known patent "Bitumastic" enamels, covering, and solution for the prevention of corrosion in iron and steel and for the protection and preservation of wood. On the stand is shown a model of the midship section of a vessel and also a model workshop with smoke stacks, etc. These are all coated with their different "Bitumastic" specialities, and must prove attractive to all visitors interested in the subject of corrosion, more especially as the firm states that their "Bitumastic" holds the world's record as an

anti-corrosive protective. There is also shown a small model of a ship's steel deck plating flushed up and levelled with patent "Bitumastic" deck covering, on which corticine is laid. This material is similar to that applied successfully to the promenade, shelter, upper, main, and lower decks, etc., of the *Mauretania*. The following advantages are claimed for using this material in place of wood decks:—no piercing of decks; more head room in 'tween decks; steel work efficiently protected; corticine, rubber tiling or parquetry easily laid on; cheaper and more durable than wood; saves weight; perfect sanitation; more air space; and no accumulation of foreign matter, as is usual under wood decks. Messrs. Wailes, Dove & Co.'s whole business is in the manufacture of "Bitumastic," which, owing to its great success, is known all over the world. Apart from executing very large orders on board the latest liners afloat, the firm's latest success is the application of "Bitumastic" to all steel and iron structures and plant on land, proving invaluable for the protection of bridges, water tanks, pithead gears, refrigerating plant, and roofs of buildings.

Proceedings of the Technical Societies.

Iron and Steel Institute.

“Economy and Design of Modern Reversing Rolling-Mill Steam Engines,” by Mr. E. G. Sehmer and Dr. R. Drawe. (4th May.)

“The Girod Furnace,” by Mr. W. Borchers. (4th May.)

“Development in the Production of Electric Power,” by Mr. D. Selby Bigge. (4th May.)

“The Elastic Breakdown of Certain Steels,” by Professor C. A. M. Smith, B.Sc. (5th May.)

“The A2 Point in Chromium Steel,” by Mr. Harold Moore, B.Sc. (5th May.)

“Some Physical Properties of Two-per-cent. Chromium Steels,” by Professor A. McWilliam, A.R.S.M., M.Met., and Mr. E. J. Barnes, As.Met. (5th May.)

“The Crystallography of the Iron-Carbon System,” by Mr. Adolphe Kroll, Junior. (5th May.)

“Some Recent Investigations on Case-Hardening,” by Mr. S. A. Grayson. (5th May.)

“The Chemical and Mechanical Relations of Iron, Manganese and Carbon,” by Professor J. O. Arnold, D.Met., and Professor A. A. Read, M.Met. (5th May.)

“Uniform Nomenclature of Iron and Steel,” by Professor J. O. Arnold, D.Met. (5th May.)

“The Cutting Properties of Tool Steel,” by Mr. Ed. G. Herbert, B.Sc. (5th May.)

“The Constitution of Cast Irons and Carbon Steels from the Practical Standpoint,” by Mr. Donald M. Levy. (5th May.)

“The Homogeneity of Metals,” by Mr. G. Tagayeff. (5th May.)

Junior Institution of Engineers.

“High-Speed Steam Turbine Rotor Design and Construction,” by Mr. J. M. Newton. (12th April.)

Association Technique Maritime.

“Formulae for the Calculation of Marine and Aerial Propellers,” by M. Drzewiecki. (11th May.)

“The Influence of Depth of Water on Speed,” by M. Hart. (11th May.)

“Marine Condensers,” by M. Leblanc. (11th May.)

“A Study of Reflex Wave Motion,” by MM. Fortant and Le Besnerais. (11th May.)

“The Launch of the *Danton*,” by M. Callou. (11th May.)

“New Formulae for the Calculation of Marine Propellers,” by M. Legrand. (11th May.)

“The Diminution of Rolling on Waves,” by M. V. Cremieu. (11th May.)

“Account of a Visit to Germany,” by M. M. E. Lascroux. (11th May.)

“Trials of the Torpedo-Boat Destroyer *Tirailleur*,” by M. Delaporte. (11th May.)

“New Rules of the Bureau Veritas,” by M. DeBerlhe. (12th May.)

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“Comparison of the Tensile, Impact-Tensile, and Repeated Bending Methods of Testing Steel,” by Mr. B. Blount, Mr. W. G. Kirkaldy, and Captain H. Riall Sankey, R.E. (Ret.) (27th May.)

Institution of Mining Engineers.

“Coal Shipment, and the Laying out of Staith Heads, with Special Reference to Anti-breakage Appliances,” by Mr. John Kirsopp, Junior.

Institute of Marine Engineers.

“Stability of Ships,” by Mr. E. Tate. (4th April.)

“Internal Combustion Engines for Marine Use,” by Mr. W. R. Cummins. (25th June.)

“Experimental Study of an Oil Engine,” by Mr. T. J. Kean. (25th June.)

Institution of Engineers and Shipbuilders in Scotland.

“A New Experimental Steam Engine at the Glasgow and West of Scotland Technical College,” by Professor A. L. Mellanby, D.Sc. (26th April.)

North-East Coast Institution of Engineers and Shipbuilders.

“Project for a Ship Canal between the Tyne and the Solway Firth,” by Mr. J. Watt Sandeman. (23rd May.)

NOTICES.

To Correspondents.

The Editor solicits any suggestions from readers for the improvement of the periodical, and every consideration will be given to contributions and illustrations offered for publication in *The Shipbuilder*. Correspondence must be accompanied by the writer's name and address, not necessarily for publication, but as a guarantee of good faith. It is preferred, however, that articles published should be signed by the writer.

Shipbuilders and marine engineers are requested to send, for insertion, reports of their launches, trial trips, etc.; and publishers are invited to forward, for review, copies of new books on subjects of interest to those engaged in shipbuilding and marine engineering.

Communications should be addressed to the Editor, *The Shipbuilder*, Newcastle-on-Tyne.

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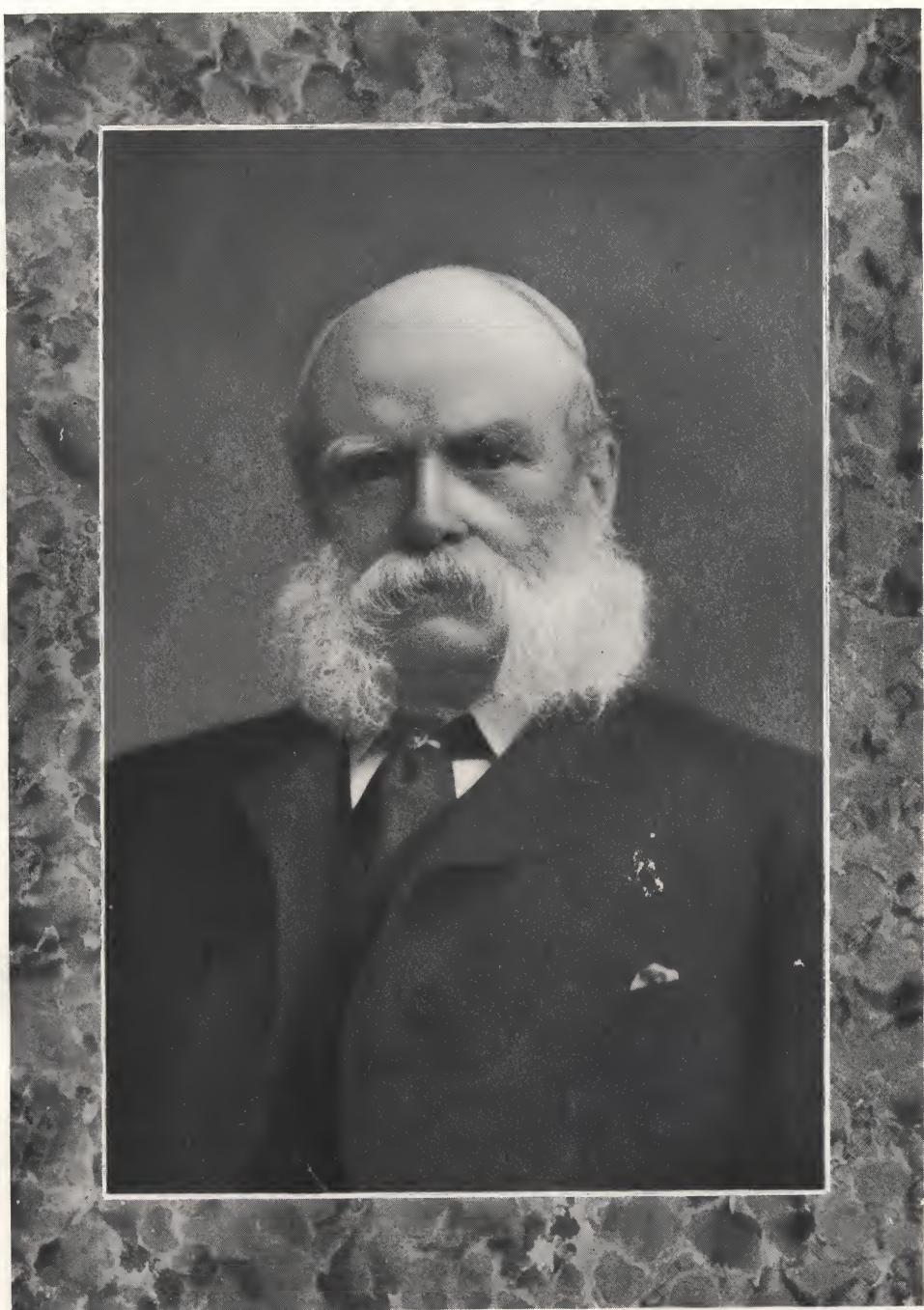


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SIR ANDREW NOBLE, BART., K.C.B.

[Elliott & Fry, London.]

THE SHIPBUILDER.

A Quarterly Magazine devoted to
The Shipbuilding, Marine Engineering and Allied Industries.

Edited by A. G. HOOD.

VOL. V.

AUTUMN NUMBER, 1910.

No. 18.

The Launch of the French Battleship "Danton."

THE launch of the battleship *Danton* at Brest Dockyard, which was only accomplished with difficulty, was the subject of a very instructive paper read recently by M. Callou before the Association Technique Maritime. The first attempt to launch was made on the 22nd May, 1909, when the vessel stuck after travelling 47 metres (154 feet), and it was not until the 4th July following that she successfully took the water. Accidents of this kind, though fortunately of rare occurrence, have happened on several occasions, notably in the case of the *Annamite* in 1876 at Cherbourg, the *Champagne* in 1885 and the *Bretagne* in 1885 at St. Nazaire, the *Pothuau* in 1895 at Havre, and the *Charles Roux* in 1907 at St. Nazaire, all of which stopped during launching. A careful consideration of the lessons to be learned from the case of the *Danton* is, therefore, most desirable.

The new berth constructed at Brest in 1906, upon which the *Danton* was the first vessel to be built, had a declivity of 55 millimetres per metre ($\frac{2}{3}$ in. per ft.), which is considerably less than the general practice in the French dockyards. The smaller declivity was adopted in order to limit the pressure upon the fore poppet at the lifting point to about 1,000 tons, but later launches have shown that fears in this respect were unfounded and a greater pressure could have been permitted, as at the launch of the battleship *Condorcet* at St. Nazaire in 1909 a reaction of about 1,730 tons was attained without any ill effects, the gradient of the ways being 70mm. per m. ($\frac{4}{5}$ in. per foot). On account of the nature of the ground, it was found necessary to excavate the new berth at Brest for about

two-thirds of its length, the sides being retained by walls of masonry 30m. (98·4ft.) apart, thus forming what may be termed a channel, shown in section in Fig. 1, in which the ship was built.

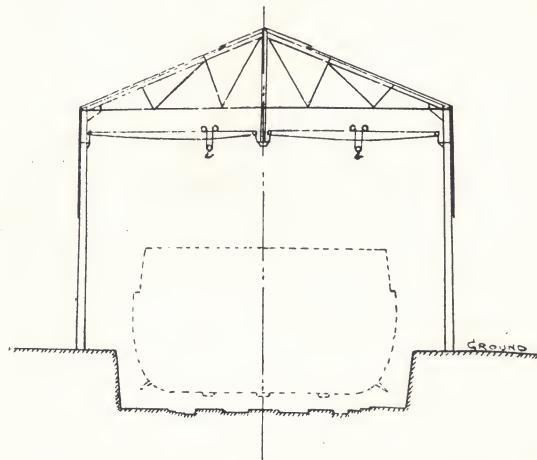


Fig. 1.

It was realized that launching in a narrow channel compared with movement into open water would cause additional resistance, but no data was available for estimating the value of this increase.

At the time of the launch the *Danton* weighed 6,500 tons. Following the usual practice at Brest Dockyard, a single way was employed 92m. (3ft.) wide and having a bearing length of 132·28m. (435 feet). The average pressure upon the ways, therefore, was 5·34kg. per sq. cm.

(4.90 tons per sq. ft.), a figure considered admissible, the *Démocratie* having been launched with an average pressure of 5.49kg. per sq. cm. (5.0 tons per sq. foot). The main features of the launch of the *Danton*, therefore, were:—

- (a) A rather high average pressure per sq. ft. on the ways, but not exceeding the limit previously admitted.
- (b) A considerably smaller launching declivity than used at earlier launches.
- (c) A certain increase in the resistance of the water (difficult to estimate) during the early part of the launch, due to motion in the channel formed by the sides of the berth.

The motion of a vessel during launching is determined by the following general equation :—

$$\frac{Wdv}{gdt} = (W - D) (\sin. \theta - f \cos. \theta) - R \dots\dots\dots(1)$$

in which W represents the weight of the ship and its cradle, D the buoyancy of the immersed portion of the ship, θ the angle of inclination of the ways, f the coefficient of friction, and R the total remaining resistance after deducting the friction upon the ways. The value of θ being small, no appreciable error is introduced by substituting $\tan. \theta$ for $\sin. \theta$, the equation then taking the form :—

$$\frac{W}{g}a = (W - D) (\tan. \theta - f) - R \dots\dots\dots(2)$$

where $a = \frac{dv}{dt}$ equals the acceleration. Up to the moment when the first drag comes into play R may be represented by μv^2 , v being the speed and μ a co-efficient depending upon the form of the vessel and of the channel into which the launch takes place. In the case of ordinary launches into open water

where b^2 represents the area of the immersed midship section and S the area of the mask, α and β being numerical coefficients. S and b^2 being expressed in square metres, the value of β usually taken is 60kg., and α is varied from 4 to 10kg. to allow for the increasing fulness of the lines as the vessel enters the water. The value of the acceleration may be determined at any instant for an actual launch by observation, but unfortunately the analysis of the curves obtained does not permit the separation of the coefficients f and μ , so that in practice it is necessary to estimate the value of f corresponding to the hypothesis previously made with regard to the value of μ .

For launches into open water this method probably suffices, but this is not the case if the launch takes place into a narrow channel, and

the value of a in such a case undergoes an increase, which it was difficult to estimate correctly at the time of the launch of the *Danton*. Owing to this uncertainty with regard to the water resistance, special attention was given to the lubrication of the ways with a view to reducing the friction as much as possible. The lubricant usually employed consists principally of tallow, which may be applied either cold or hot. Experiments made before the first attempt to launch the *Danton* resulted in the application of hot melted tallow, which was put on with brushes. The initial thickness was 7mm. (.28in.), which was finally reduced to 4mm. (.16in.) when driving up the wedges. Such were the general conditions existing when the first attempt was made to launch on the 22nd May. The vessel started without difficulty. Analysis of the speed record showed that the coefficient of friction at the start had been .037, so that the force acting on the retaining shores was $6500 (.055 - .037) = 117$ tons. The maximum speed attained was 2.54m. per sec. (8.3ft. per sec.) after a period of 13 seconds, the vessel having then travelled 21.54m. (70 feet). The speed then rapidly decreased, and the vessel stopped at the end of 31 seconds, after a run of 47.16m. (154 feet). In this position the after end of the sliding way was still 2.8m. (9ft.) forward of the end of the fixed way, so that the vessel was not in a dangerous position and she was safely shored up again before midnight.

An examination of the sliding surface of the ways showed that the coating of tallow had proved to be of very insufficient resistance to the pressure and had almost entirely disappeared, while traces of superficial carbonization were noticed in several places. It was subsequently found the tallow had been of inferior quality, its point of fusion being only 34° C. To make the launch possible, it was considered necessary to re-coat the ways with tallow capable of resisting the pressure for at least 30 seconds. To seriously lighten the vessel could not be thought of, and it was, therefore, decided to use additional lateral ways 450mm. (18in.) wide. It would thus be possible to obtain a total bearing area of 159 sq. m. (1,710 sq. ft.), the average pressure per sq. m. thus being reduced to about 4kg. per sq. cm. ($3\frac{3}{4}$ tons per sq. foot). Work was commenced immediately, the only trouble being experienced at the after end, where operations could only be proceeded with at low tide.

In the meantime numerous experiments were made with regard to the lubricant to be employed. After having tried various mixtures and tallows of different quality, a very pure tallow having a fusion point of 40° C. was chosen and applied in the following manner. Upon the central way

was first poured a coating of melted tallow 8mm. (.32in.) thick. When this coating commenced to congeal, water at a temperature of about 50°C . was run over the surface, which was then allowed to cool. In this way a thin, firm coating free of cracks was obtained, having a slightly soapy surface. Such a coating was found to support for an indefinite period a static pressure of 6kg. per sq cm. A coating of 22mm. of tallow mixed with 4 per cent. lard, previously kneaded into small balls, was then put on by hand, and finally a thin coating of soft soap. The coating upon the lateral ways was obtained by applying successive layers of liquid tallow with mops. The surface

rapidly and becomes negative, only increasing again after a course of 55m. (180 feet). Now the decrease of acceleration must be due to an abnormal retarding force. That no abnormal resistance due to friction existed is proved by the fact that there were no signs of seizing, and most of the ways still carried a coating of tallow after the launch, while the quality and method of application of the lubricant had been shown by experiment to be very satisfactory. The only explanation is, therefore, that there was an abnormal increase in the water resistance due to motion in the channel. By placing the outline of the berth beneath the observed curve as in

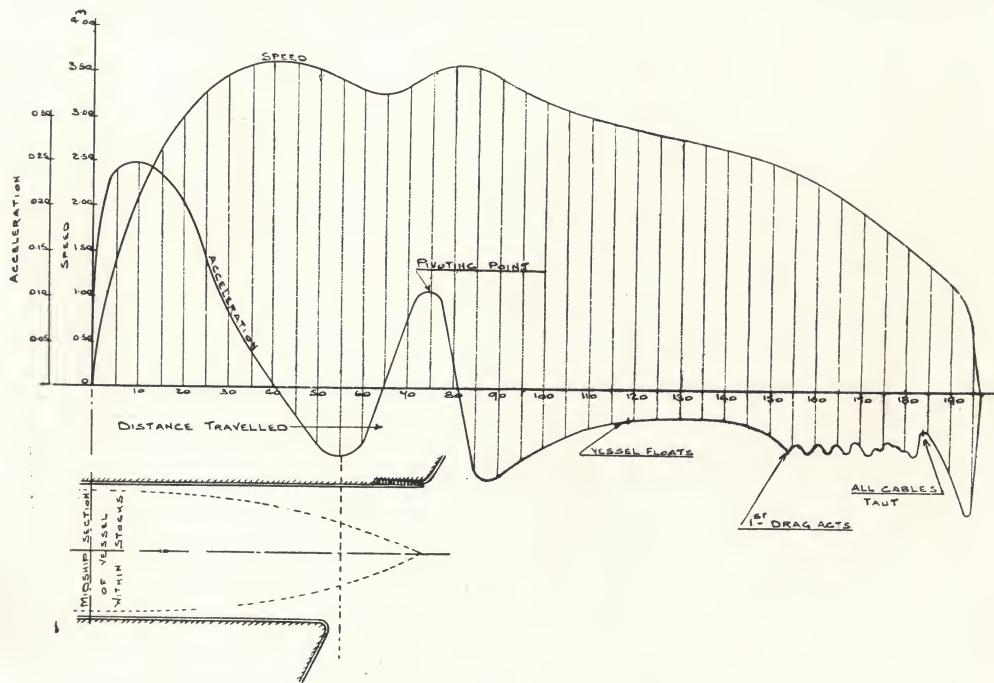


Fig. 2.

thus obtained was considerably less firm than by the method adopted for the central way, but it was difficult to proceed otherwise.

Under these conditions the actual launch of the *Danton* was successfully accomplished on the 4th July, but those on board noticed a marked flagging of the vessel. The speed and acceleration curves obtained from observations made at the launch are shown in Fig. 2. The acceleration was measured directly by means of a pendulum. The abnormal shape of the acceleration curve, and consequently of the speed curve, will be noticed at once. The acceleration, after increasing for the first 10m. (33ft.), decreases

Fig. 2, it will be seen that the stopping point of negative acceleration exactly corresponds to the time at which the midship frame of the vessel cleared the mouth of the exit and passed into open water. There was at this moment a very marked decrease in the resistance of the water, and consequently a positive acceleration and new impulse were given to the ship. By reasonably lengthening the descending portion of the acceleration curve, it will be found that an elongation of the channel by 30m. (98ft.) would have been sufficient to stop the vessel.

No mask was used at the second launch, so that R in equation (2) can be represented by

$a b^2 v^2$ up to the instant when the drags began to act. Substituting this value in equation (2), we have

$$f(W - D) + a b^2 v^2 = (W - D) \tan. \theta - \frac{W}{g} a \dots (4)$$

The unknown factors in this equation, as before stated, are f and a , and it is not possible to assign a definite value to each. Only their combined effect is known, but some idea of the separate values may be obtained in the following way.

For any particular position of the ship, equation (4) may be considered to represent the equation for a straight line of which the co-ordinates represent f and a , the values of f being obtained by assuming a series of values for a . Values for f and a calculated in this way are shown for every 5m. of travel in Fig. 3. It will be seen at once from this figure that for the first 20m. (66ft.) the value of f is practically independent of the value given to a . Whatever a may be supposed to be, it is certain that for this period the value

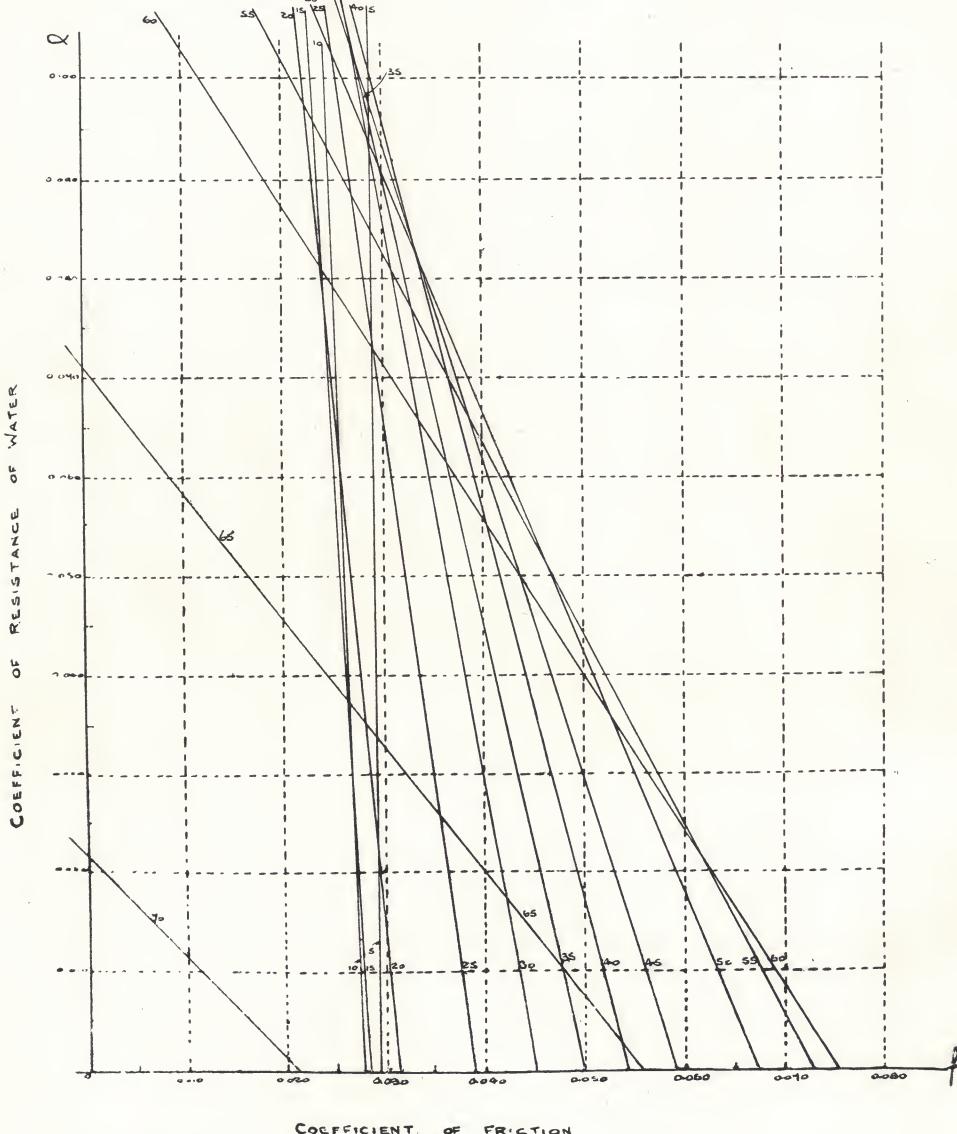


Fig. 3.

of f was between .027 and .031. At 5m. (16ft.) travel it will be seen that the value of f was .0295, and a minimum value of about .028 occurred after a travel of from 10 to 15m. After this the respective values of f and a are uncertain, but f must have undergone some increase. It would appear that f , after passing through a minimum at the time of liquefaction of the tallow, increases again as the tallow runs out. At the end of 55m. (180ft.) travel, the value of f was certainly inferior to .072, but it is not known how much.

A consideration of the launching curves shows, therefore, that from 0 to 10m. (0 to 33ft.) the coefficient of friction decreases, and, there being practically no water resistance, the ship acquires

at 82m. (220 feet). At 75m. (246ft.) lifting commences, and the pressure upon the fore poppet forms an energetic brake at from 75 to 85m. (246 to 278ft.), this action gradually decreasing up to 122m. (400ft.), when the ship floated off.

After floating, and before the drags came into action, the resistance is only that due to the water, and we have

$$\frac{W}{g} a = \alpha b^2 v^2$$

for which the value of α can be obtained for this distance and has been plotted in Fig. 4. It will be seen that for some 15m. (50ft.) the curve

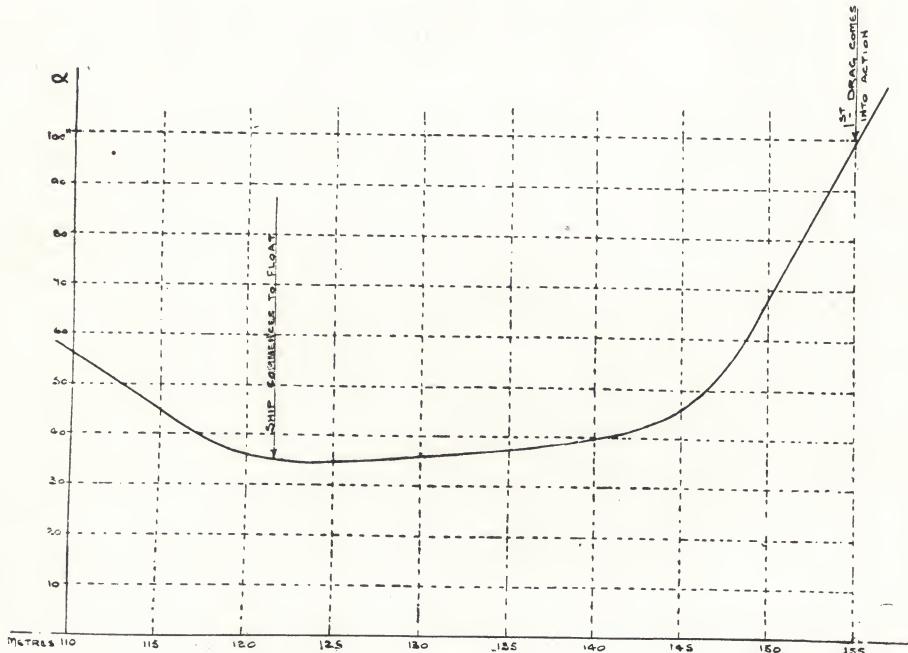


Fig. 4.

a good speed. From 10 to 55m. (33 to 180ft.) the coefficient of friction increases a little, but remains within moderate limits; while the water resistance rises very rapidly, the ship, acting like a piston, expelling the water in front of it and creating behind the midship section a void, which the water choked between the side of the ship and the berth cannot gain. At 55m. (180ft.) the midship section passes the mouth of the berth, and the more rapid flow of water into the channel causes a reaction, giving an extra impulse to the ship; and the speed, having passed through a minimum of 3.38m. (11ft.) per second at 65 metres (213ft.), increases to 3.54m. (11.6ft.) per second

remains nearly horizontal, with a value for α of 34kg. By applying the same method to other launches, the following values have been obtained:

Edgar Quinet	16kg.
Démocratie	19kg.
Leon Gambetta	12kg.
Diderot	31kg.

Unfortunately these figures are greatly influenced by the degree of accuracy with which the acceleration a is measured, and which is ordinarily obtained by a double differentiation of the curve of distance run, instead of being measured directly as in the case of the *Danton*.

It seems certain, however, that the value of 6 to 10kg. usually assumed is much too low, and a value of 20kg. would be nearer the mark for ships of the form in question. Returning again to Fig. 3, it will be seen that, assuming the value of f was maintained from 20 to 55m. (66 to 180ft.) at about .035, a would have to gradually increase from 20 to about 95kg. These values, therefore, may be considered to give a very hypothetical

but probable enough estimate of the resistance due to the effect of the channel.

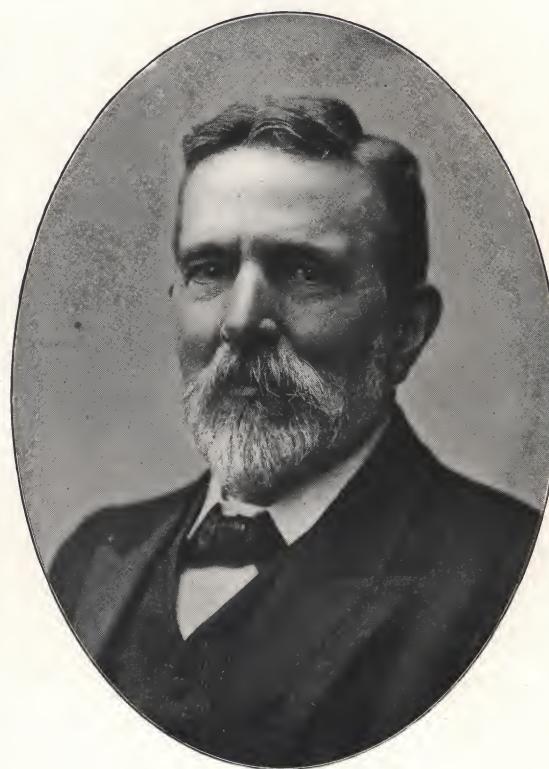
Since the launch of the *Danton* the declivity of the berth has been increased from 55 to 60mm. ($\frac{3}{8}$ to $\frac{2}{3}$ in. per foot), and the width between the side walls from 30m. to 34.80m. (98 to 114ft.) under the building shed, while outside the shed the walls have been sloped at an angle of 20 degrees to permit an easier influx of the water.

Mr. S. J. P. Thearle, D.Sc.

AT a special convocation of the University of Durham held at the Armstrong College, Newcastle, on the 3rd October, the honorary degree of Doctor of Science was conferred upon Mr. Samuel James Pope Thearle, the Chief Ship Surveyor of Lloyd's Register of Shipping. That Mr. Thearle's services to the science of naval architecture should thus be recognised from the ancient seat of learning will give unqualified satisfaction throughout the shipping and shipbuilding world, and we desire to tender to him our hearty congratulations on this well-merited honour.

Dr. Thearle was born in Devonshire in 1846, and commenced his technical training at the Royal School of Naval Architecture, South Ken-

sington, of which institution he holds the diploma of Fellow. From 1869 to 1876 he was engaged in the construction department of the British Admiralty and in the inspection of vessels built under contract for the Royal Navy. His connection with Lloyd's Register of Shipping began in 1876, when he received a surveyorship. After serving in different parts of the country, he was appointed assistant to the Chief Ship Surveyor in London in 1900; and last year, on the retirement of Mr. Harry J. Cornish, he succeeded to the post of Chief Ship Surveyor. Dr. Thearle is the author of several books relating to his profession, the earliest dating back to the time when other shipbuilding text-books were practically non-existent.



Mr. S. J. P. Thearle.



No. 13.—SIR ANDREW NOBLE, BART., K.C.B.

NEWCASTLE-UPON-TYNE has lately conferred the honorary freedom of the city upon Sir Andrew Noble, the chairman of Sir W. G. Armstrong, Whitworth and Company, Limited, on the completion of his fifty years' service with that firm. It was only in 1886 that the power of making honorary freemen was restored to Newcastle, and the first citizen thus honoured was the late Lord Armstrong, the founder of the great works with which Sir Andrew Noble has been so long associated. Since 1886 the privilege has been used with wise discrimination, and the list of honorary freemen is a small and distinguished one. The recognition of Sir Andrew Noble's scientific eminence and his services to the country was both appropriate and thoroughly well deserved.

The subject of this sketch was born at Greenock on the 13th September, 1831. He was the second of four sons of Captain George Noble, a retired naval officer, and, after being educated at Edinburgh Academy, became a cadet at Woolwich in 1847. Two years later he received a commission in the Royal Artillery, and served abroad with his regiment in Malta, South Africa, and Canada. In the late fifties, after the conclusion of the Crimean War and the Indian Mutiny, the minds of men connected with the Army and Navy were exercised by rival designs of new artillery, intended to supersede the ancient smooth-bore guns. Hardly any advance had been made for half a century in field and naval artillery; and the sensation was considerable when, in 1858, Mr. Armstrong, a Newcastle engineer, submitted to the War Office a breech-loading rifled piece of novel pattern and of an accuracy hitherto unknown. Captain Noble, as he then was, had already made something of a name as an officer of scientific attainments, and in the trials of the

new artillery, as well as in the various controversies which ensued, he took a prominent part. He was appointed secretary to more than one special committee which dealt with these questions, and he was soon recognized as one of the leading experts in his own line. It was very natural that Sir William Armstrong, when he was looking out for somebody to assist in the management of his new Ordnance Works at Elswick, should have marked down Captain Noble as the man for his purpose. In the autumn of 1860 the young officer resigned his commission and joined the firm of Sir W. G. Armstrong and Co. as a partner.

In the fifty years which have passed since that date, the firm has become one of the largest business enterprises in the country, and the main portion of its output consists of war material. But as regards its gun-making department, hardly any company can have had a more complicated or difficult start. The original idea in 1859, when the Armstrong artillery was first turned out from Elswick, seems to have been that the place should gradually develop into a regular Government arsenal, for its efforts were strictly confined to Government work, and all foreign observation was excluded by regulations enjoining the strictest secrecy upon those connected with the manufacture of the new guns and mountings. Four years later saw this policy entirely changed. Not only was all patronage withdrawn from Elswick, but almost every characteristic of the Armstrong system was abandoned. Muzzle-loading was re-introduced; and, as far as the British services were concerned, for ten or fifteen years there might just as well have been no experts at Elswick at all, for no official notice seems to have been taken of them or their doings. Meantime the Armstrong Company lived and

increased upon foreign orders, and during the same period Sir Andrew Noble was carrying out those researches in fired explosives, which have really made not only his own scientific reputation but the fortune of the works to which he belonged. With a patience and a thoroughness which no enquirer in the same field had ever shown, he investigated the nature of explosives and explosions by firing charges of gunpowder in a closed vessel. He took pressures and temperatures, analyzed the solid and gaseous products, and invented a chronoscope, which recorded the millionth of a second, and timed the travel of a shot in the bore of a gun. His "Researches on Explosives," a volume issued during the seventies in collaboration with the late Sir Frederick Abel, is the text-book of a science which can hardly be said to have existed before his own studies and experiments were given to the world.

In 1870 Sir Andrew Noble was elected a fellow of the Royal Society, upon the council of which he has served more than once. The practical results of his investigations were certain alterations in the design of guns. It was found possible to increase the charges and the size of the chamber, while the gun was lengthened to its present shape. An important addition to the velocity and energy of the shot was thus obtained. Other improvements, such as new breech mechanism and quick-firing arrangements, were also adopted. Trial guns were submitted to the British Government, and in 1887 extensive orders for the new artillery were placed with the Armstrong Company. Since that date the Admiralty and War Office have been the chief customers at Elswick.

In 1860, when Sir Andrew Noble went to Elswick, there were about 1,500 men employed in the Engine Works and Ordnance Department, and some 20 acres of land were owned by the firm. Many extensions were made in the ensuing two decades, and in 1882 the present limited company was started, with a capital of £2,000,000. In this was included the shipyard at Walker-on-Tyne of Messrs. Charles Mitchell and Co., the intention of the directors being to build warships there. This plan was not carried out, for a second shipyard was shortly afterwards opened at Elswick. This latter yard is situated on the river above the High Level and Swing Bridges, which form a narrow and awkward passage for battleships of modern dimensions. Within the last few months it has been announced that the Company propose to transfer their warship work to some new land acquired lower down the river. Messrs. Mitchell's yard has been used for the construction of merchant vessels. In 1885 a connection of long standing with the Italian Government was cemented by the opening

of ordnance works at Pozzuoli, on the Bay of Naples. Even more important than this was the purchase, in 1897, of the undertaking of Sir Joseph Whitworth & Co., at Manchester, where a branch for the making of armour plates was started. Land has also been acquired and workshops built at Scotswood-on-Tyne, where the manufacture of projectiles and of motor cars is now carried on. Altogether the workmen employed by the Company in 1910 number about 25,000, and the land owned by the Company is about 300 acres.

Attention has already been directed to the effect which the scientific studies of Sir Andrew Noble have exercised upon that branch of the business which he has made peculiarly his own. His services to his Company, however, have been far more than this. Over all the development briefly sketched in the foregoing paragraph he has presided with unusual judgment and ability. He represents that rather rare character which is a combination of profound technical and scientific skill with businesslike shrewdness and energy. For example, it may be mentioned that whenever there have been vexed questions of labour, involving conferences and discussions with trade union delegates, hardly anyone could handle the negotiations better than Sir Andrew. As President of the Engineering Employers' Association he used in past years to take an active share in such controversies, and his conduct in the chair earned for him the respect of colleagues and adversaries alike.

Apart from his unceasing devotion to his duty, and his boundless enthusiasm in the service of his Company, it is needless to say that Sir Andrew Noble possesses those indefinable qualities which go to make up a commanding personality. He has that strength and decision of character which make a man a leader of his fellow-men. Even now, after so many years at Elswick, little escapes his attention, and he remains thoroughly conversant with everything that is going on.

It must not be thought that Sir Andrew's scientific and business pursuits by any means fill up the whole of his life. He has very wide sympathies and interests and a great capacity for enjoyment. In his youth he was an athlete of some prominence, and played racquets for the Artillery. Some years ago he built himself a real tennis court at his house near Newcastle, and he has always been a generous patron of cricket in Northumberland. Perhaps the favourite amusement of his later life has been shooting. He used to rent Chillingham Castle in Northumberland, and still has a pheasant shoot at Wretham, in Norfolk. In 1906 he bought the estate of Ardkinglas in Argyllshire, at the head of Loch

Fyne, where he built a mansion house, finely situated on the shores of the loch. This has been a great interest to him, and he entertains there in the autumn his countless friends. He is the most omnivorous reader of general literature, though his taste in fiction at least leans rather to the old favourites, and one wonders if any living man has a closer acquaintance with the works of Sir Walter Scott.

It would be tedious to enumerate the foreign honours that have fallen to Sir Andrew Noble. Apart from scientific distinctions that have been awarded to him by Continental academies, he

has, owing to his connection with Elswick, been brought into touch with many far-off nations, and has received decorations from numerous potentates. In his own country, he was made a C.B. in 1881, a K.C.B. in 1893, and a Baronet in 1902. His wife, Lady Noble, is one of the best-known hostesses in Newcastle, and a consistent patroness of all good works. Her popularity is as great as that of her husband. Sir Andrew has four sons and two daughters. His eldest son, Major Noble, was in the 13th Hussars, but retired some years ago.

Proceedings of the Technical Societies.

Iron and Steel Institute. (28th and 29th September.)

“ Electric Steel-Refining,” by Mr. D. F. Campbell.

“ The Hanyang Iron and Steel Works,” by Mr. G. Chamier.

“ Manganese in Cast Iron and the Volume Changes during Cooling,” by Mr. H. J. Coe, B.Sc.

“ Sulphurous Acid as a Metallographic Etching Medium,” by Mr. E. Colver-Glaert and Mr. S. Hilpert.

“ The Theory of Hardening Carbon Steels,” by Mr. C. A. Edwards.

“ The Influence of Silicon on Pure Cast Iron,” by Mr. A. Hague, B.Sc., and Mr. T. Turner, M.Sc.

“ The Preparation of Magnetic Oxides of Iron from Aqueous Solutions,” by Mr. S. Hilpert.

“ The Manufacture of Rolled ‘H’ Beams,” by Mr. G. E. Moore.

“ The Utilization of Electric Power in the Iron and Steel Industry,” by Mr. J. G. Schnurmarm.

“ The Briquetting of Iron Ores,” by Mr. C. De Schwarz.

“ Some Experiments on Fatigue of Metals,” by Mr. J. H. Smith.

Institute of Metals. (21st and 22nd September.)

“ Magnetic Alloys formed from Non-Magnetic Materials,” by Mr. A. D. Ross, M.A., B.Sc.

“ The Heat Treatment of Brass,” by Mr. G. D. Bengough, M.A., and Mr. G. F. Hudson, M.Sc.

“ Shrinkage of the Antimony-Lead Alloys and of the Aluminium-Zinc Alloys during and after Solidification,” by Mr. D. Ewen, M.Sc.

“ Some Common Defects occurring in Alloys,” by Mr. C. H. Desch, D.Sc., Ph.D.

“ The Effect of Silver, Bismuth, and Aluminium upon the Mechanical Properties of ‘Tough-Pitch’ Copper containing Arsenic,” by Mr. F. Johnson, M.Sc.

“ Metallography as an Aid to the Brass-Founder,” by Mr. H. S. Primrose.

Institute of Marine Engineers. (17th September.)

“ Electro-Magnetic Transmission for Main Marine Propulsion,” by Mr. Jules Lecoche.

“ The Telemotor,” by Mr. W. G. Gibbons.

“ The Internal-Combustion Engine,” by Mr. Wm. P. Durtnall.

British Association, Section G.

“ The Testing of Heat-Insulating Materials,” by Mr. F. Bacon, M.A. (6th September.)

“ The Optical Determination of Stress,” by Professor E. Coker. (6th September.)

“ Gravity Self-Raising Rollers for Maps and Plans,” by Mr. R. W. Weekes. (7th September.)

“ Experimental Investigation of the Strength of Thick Cylinders,” by Mr. G. Cook. (7th September.)

“ A New Method of Testing the Cutting Quality of Files,” by Professor W. Ripper. (2nd September.)

“ The Testing of Lathe Tools,” by Professor W. Ripper. (1st September.)

“ Gaseous Explosions: Third Report of the Committee appointed for the Investigation of Gaseous Explosions, with special reference to Temperature.” (2nd September.)

“ Air Supply to Gas Engines,” by Professor W. E. Dalby, M.A., B.Sc. (5th September.)

“ The Value of Anchored Tests of Aerial Propellers,” by Mr. W. A. Scoble, B.Sc., and Mr. S. C. Carter. (2nd September.)

The New British "Town" Cruisers.

NOW that the shipbuilding firms entrusted by the British Admiralty with the construction of the five fast second-class protected cruisers of the Naval Programme of 1908-9 have practically completed their contracts—the *Bristol*, the last of the vessels, having just completed her official trials as we go to press—it is interesting to put on record the remarkable success achieved by all the contractors, not only in regard to trial results but also in regard to rapidity of delivery. The contracts for the five cruisers—known as the *Glasgow*,

the Admiralty, and the *Bristol* will shortly follow.

The five cruisers, which have already been described in our pages,* displace about 4,800 tons, and were designed to maintain a speed of 25 knots with 22,000 shaft horse-power. They are sister ships, the principal difference being that while the *Bristol* is propelled by two sets of Brown-Curtis turbines working two propellers, the other four ships are fitted with Parsons turbines mounted on four shafts, each driving a propeller. On each of the outer shafts there is a h.p. ahead and a h.p. astern turbine, placed in



H.M.S. "Newcastle," on Full-Power Trial.

Liverpool, *Newcastle*, *Gloucester*, and *Bristol*—were placed in November, 1908, with the Fairfield Shipbuilding & Engineering Co., Govan, Messrs. Vickers, Sons & Maxim, Barrow, Sir W. G. Armstrong, Whitworth & Co., Elswick, Messrs. William Beardmore & Company, Dalmuir, and Messrs. John Brown & Company, Clydebank. The actual construction of the vessels, however, as indicated by the laying of the keels, was not commenced until several months later. The *Glasgow* ran her official trials in May last; the *Liverpool*, in June; the *Newcastle*, in July; the *Gloucester*, in August; and the *Bristol*, in September. The *Liverpool*, *Newcastle*, *Gloucester*, and *Glasgow* have already been handed over to

watertight wing compartments. The two inner shafts are each driven by a l.p. ahead turbine, with which is incorporated a l.p. astern turbine, installed in a central watertight compartment, and provided with independent manoeuvring valve. These cruisers are the first to be built for the British Government in which separate cruising turbines are dispensed with. The *Bristol*'s two sets of Brown-Curtis impulse turbines, each independent of the other, are in separate compartments, and the two condensers are each installed in a watertight wing compartment. The design of this machinery—the first of its kind fitted in a British warship—was

evolved by Messrs. John Brown & Co. at their experimental station at Clydebank, where they fitted up a complete installation of turbines for the purpose of determining by experiment questions of design before putting in hand the machinery for the *Bristol*. The steam-generating installation in all five vessels consists of twelve Yarrow small-tube boilers designed to use both coal and oil fuel, and arranged in three separate boiler rooms.

The speed trials consisted of a thirty hours' run, to determine the fuel endurance, divided into two periods of twenty-two hours' duration at about 66 per cent. and eight hours at 80 per cent. of the full power, followed by an eight hours' run at full power, and the results of these trials will be found in the appended table. It will be observed that in the case of the *Liverpool*, *Newcastle*, and *Bristol* some of the figures given relate to the averages obtained on six runs over the measured mile at the various powers. The Wallsend Slipway and Engineering Company constructed the propelling machinery for the *Newcastle*, and the other four vessels were

engined by their respective builders. The turbines of the *Gloucester* were the first constructed by Messrs. William Beardmore and Co. The fuel consumption is not given in the case of the *Bristol*, but it may be stated that practically the same mileage per unit of water consumption was obtained as in the other four vessels, and the water evaporated per ton of coal is a fairly constant unit.

It may be added that four cruisers of a somewhat improved type were ordered under the Naval Programme of 1909-10—the *Falmouth* from Messrs. William Beardmore & Co., the *Dartmouth* from Messrs. Vickers, Sons & Maxim, the *Weymouth* from Sir W. G. Armstrong, Whitworth & Co., and the *Yarmouth* from the London and Glasgow Engineering and Iron Shipbuilding Co., Govan—while under the Programme of this year three still further improved vessels will be laid down, two in private yards and one at Chatham Dockyard. The *Falmouth*—the first to be launched of the four 1909-10 cruisers—was put into the water on September 20th, and her general particulars will be found in our Launches columns.

	Glasgow.	Liverpool.	Newcastle.	Gloucester.	Bristol.
22 hours at 66% power.					
Shaft horse-power	14,055	13,970 14,102 (6 runs)	14,038 14,051 (6 runs)	13,968	14,300
Mean r.p.m., 4 propellers	430	426·5 (6 runs)	420·5
Consumption (coal) per S.H.P. per hour.	1·61 lb.	1·57 lb.	1·65 lb.	1·59 lb.
Mean speed (knots)	23·7	23·883 (6 runs)	23·342 (6 runs)	23·447	24·06 (6 runs)
8 hours at 80% power.					
Shaft horse-power	18,220	18,614 18,824 (6 runs)	18,742 19,116 (6 runs)	18,983	19,130
Mean r.p.m., 4 propellers	471	464 (6 runs)	461·6
Consumption (coal) per S.H.P. per hour.	1·57 lb.	1·59 lb.	1·65 lb.	1·48 lb.
Mean speed (knots)	24·9	25·102 (6 runs)	24·841 (6 runs)	25·084	25·17 (6 runs)
8 hours at full power.					
Shaft horse-power	22,500	24,718 (6 runs)	24,669 25,417 (6 runs)	24,335	24,227
Mean r.p.m., 4 propellers	499	512·7 (6 runs)	518·2
Consumption (coal) Do. (oil)	1·63 lb. coal	1·65 lb. coal	Coal, 1·036 lb. Oil, 0·171 lb.	Coal, 1·14 lb. Oil, 0·42 lb.
Mean speed (knots)	25·8	26·171 (6 runs)	26·266 (6 runs)	26·296	26·84 (6 runs)

The Ayre-Ballard Type of Cargo Steamer.

By MAXWELL BALLARD, Naval Architect.

ATHE requirements of the shipowning community, with the endeavour to offer prospective purchasers the most commercially desirable design of vessels for the varying trades in which they are to be employed, may be said to have been the guiding instinct of naval architects throughout the extraordinary changes in design of cargo vessels which have taken place in recent years. That new types should be brought forward for the approval of owners is to be expected when it is remembered that finality and standardization have not yet been reached or the resources of shipbuilders exhausted.

In tracing the various stages in the process of development from the steel vessels of, say, only so far back as the early nineties to the latest examples turned out, one cannot but be struck by the rapidity with which the principles of design have apparently been altered. We were brought up with the idea that multitudinous tiers of beams were essential, that heavy supports to same were only natural, and that their elimination was to be regarded gravely and only permitted at the expense of heavy compensation. The explanation of such conceptions of design can probably be traced to the constructive methods of wood shipbuilding, backed by a perhaps not altogether undesirable conservatism. The initiative taken by builders and the advanced policy of the registration societies during the last few years, however, as evinced by the developments of ordinary constructive methods and the introduction of numerous patent types of vessels, surely indicate the realization that the earlier methods were based on misconception of the true principles of design and the distribution of material in the cross section.

As a problem in girder construction, and regarded from the standpoint of scientific and economical distribution of material, and apart from the bias of previous constructive methods, the natural and preferable design for a ship girder would be that in which a box form is most nearly approached. The trade requirements of general cargo tramps conduce to this desirable arrangement, and the construction of so many large single-deckers indicates that owners realize

this; for, given a fair trial, the survival of any design may be taken to mark its commercial success.

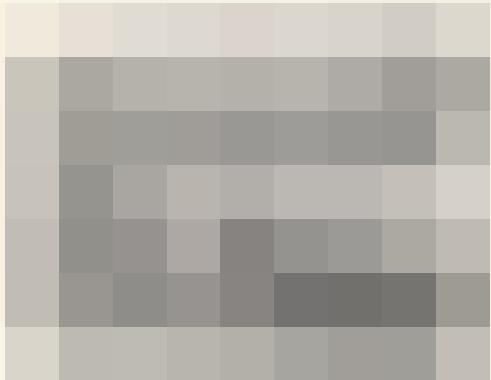
In ship construction—without doubt the most complex of all engineering problems—the designer must attach primary importance to the economical distribution of material in the cross section; for this, strictly speaking, is the controlling factor, and upon it depend, more or less, the remaining features of the design. The problem may be summed up thus briefly—to so distribute a minimum of the material at present at the disposal of the designer as to obtain satisfactory strength (in its widest sense), the desired draught, and assured stability conditions, together with large capacity and low net register; the resultant form to be such as will effect economy in driving and maintenance. To fulfil these conditions, it is essential that the designer should appreciate results from the owner's standpoint and even perhaps to some extent submerge his own ideas to meet those of the owner; for any design which cannot offer to the latter certain commercial advantages and inducements, apart from scientific ones, must be promptly abandoned.

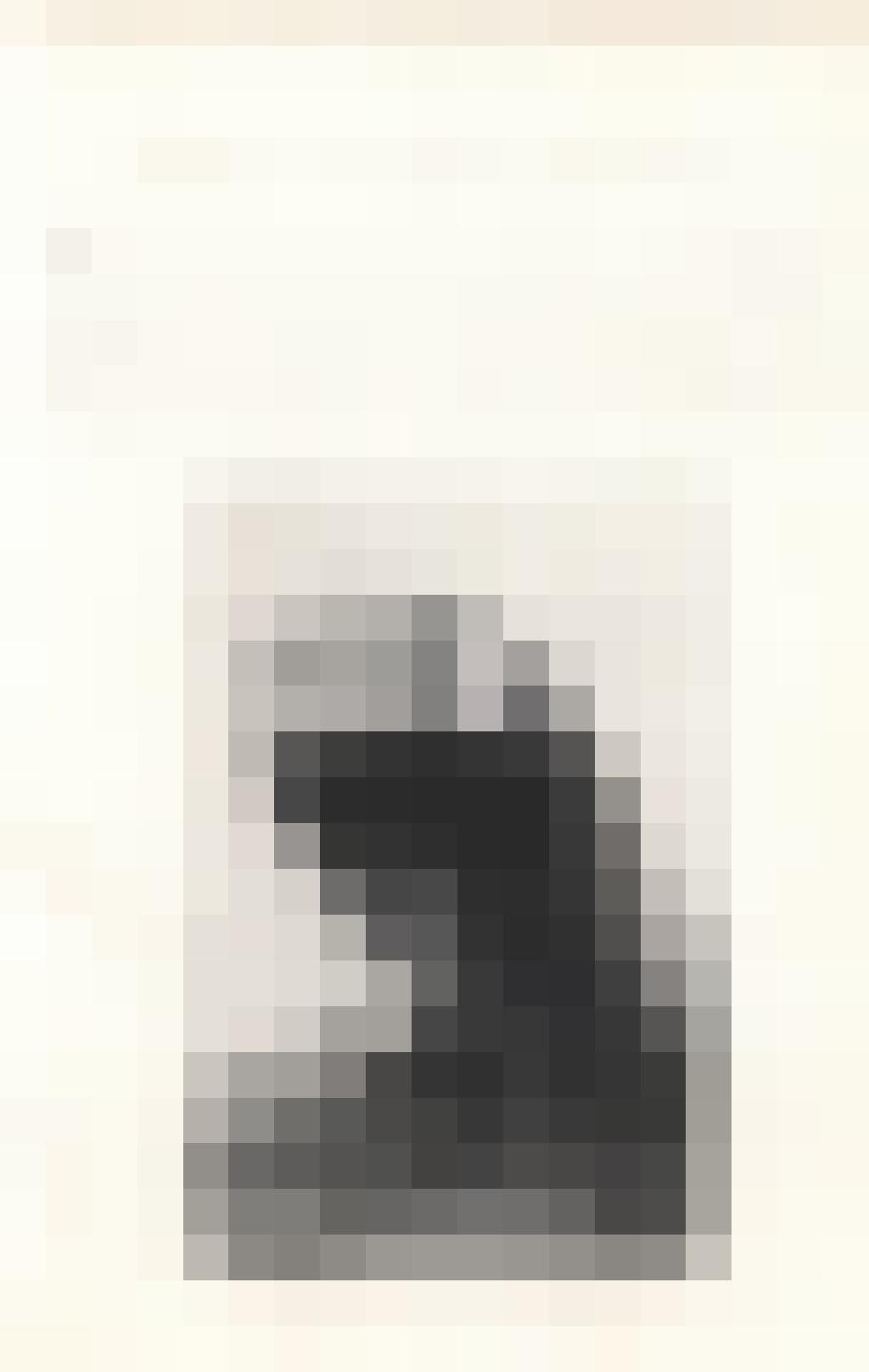
In the Ayre-Ballard design, which is briefly described hereafter, an attempt has been made to utilize the natural strength due to form more than hitherto, the writer believing that sufficient attention has yet to be paid to this consideration. Concisely speaking, it may be stated that an increase in the size of the vessel has been made with a less total girth of material than hitherto employed, and herein lies the saving which is the primary commercial inducement offered by the type to intending owners.

The "arch principle" of construction, as it is termed by the patentees, consists of a transverse arch over and above the normal hull and forming an integral portion of the same. The junctures of the arch sides or abutments, at the upper and lower corners, form, in association with the other structure, rigid terminations of the vertical and horizontal spans of the transverse girders. Reference to the figures will make this clear. As shown in the perspective view, the transverse system of framing is adopted, though doubtless,













destroyers are manned by officers and men of the Commonwealth Navy, although the stokers are, until the Colonials acquire experience of oil fuel, men of the Royal Navy. Replenishing their oil fuel at various ports on the way, the voyage to Sydney, it is expected, will last about two months. The *Yarra*, whose final trials took place on the Clyde on the 25th August, was built by Messrs. William Denny & Brothers, Dumbarton; while the sister vessel, the *Parramatta*, is the product of the Fairfield Shipbuilding and Engineering Co., Govan. Both vessels were designed, and superintended during construction, by Professor J. H. Biles, and in all their trials more than fulfilled the requirements of the Australian Government in the vital respects of speed, consumption of fuel, and radius of action.

frozen meat cargoes between Buenos Ayres and Great Britain. No fewer than ten of the steamers of the fleet have been built by Messrs. Russell and Co. The leading particulars of the *Highland Scot* and *Highland Glen* will be found in our Launches' columns.

The extensive shipbuilding programme inaugurated about the end of last year by the British India Steam Navigation Company, which comprised the addition to the fleet of twelve new steamers of varying type, is being steadily proceeded with, and there is a likelihood of more contracts being placed shortly. Three-fourths of the new tonnage is in the hands of Clyde firms. Four large twin-screw vessels were ordered from Messrs. Barclay, Curle & Co., Whiteinch, three from Messrs. Alexander Stephen & Sons, Lint-



Photo by

Messrs. Barclay, Curle & Co.'s Shipyard.

[J. & R. Couper, Glasgow.]

A third destroyer, the *Warrego*, has been built at Fairfield and shipped in portions to Australia, where she will be put together by the Colonial workmen who have taken part in the preparation of the work on the Clyde.

Since our last report was written, two additions to the Nelson Line of meat carriers (Messrs. H. and W. Nelson, Liverpool and London), the *Highland Scot* and the *Highland Glen*, have been handed over by their builders, Messrs. Russell & Co., Port-Glasgow, and the order received for another vessel of about the same dimensions and power as the four steamers immediately preceding. Within twelve months, approaching 80,000 tons of specialized shipping, involving a capital of well on to £2,000,000, has been built for this line alone, and put into service in the carrying of passengers and

house, and two from Messrs. William Denny and Brothers, Dumbarton. Apart from the Clyde contracts, other two vessels are in the hands of Messrs. Workman, Clark & Co., Belfast, and one at the works of Palmers Shipbuilding and Iron Company, Jarrow-on-Tyne. The first of the quartette built by Messrs. Barclay, Curle & Co.—the *Chilka*—which, as announced elsewhere, was launched on the 23rd August, has since been tried for speed, and the guaranteed performance of $17\frac{1}{2}$ knots on the measured mile—providing for 17 knots on service—easily attained. The photograph which we reproduce shows the four British India vessels on the stocks at Messrs. Barclay, Curle & Co.'s yard, while in the fitting-out berth alongside may be observed the Russian twin-screw mail steamer *Kursk*, also built by

them. The first of the trio building by Messrs. Stephen—the *Abhona*—was launched on the 6th September, and will shortly run her trials.

Dredgers of every type, and the barges and other plant usually attendant on same, form, as is well known, no inconsiderable part of the Clyde shipbuilding output. Four firms in particular devote their energies almost entirely to this special branch of the industry; and while the volume of output since the year began is not more than an average figure, the 7,000 odd tons embrace a few productions worthy of special note, and new contracts are now in hand of which the same may be said. Dredging clay and other hard material by suction methods, through the agency of spiral cutters working at the mouth of the suction pipes, is only a recent development in dredger-building, and the first “Simons” patent cutter suction hopper dredger of this type constructed for use in the United Kingdom was launched from the works of Messrs. William Simons & Co., Renfrew, on the 6th September. This was the *St. Lawrence*, built to the order of the Director of Works of the British Admiralty, and described at length in our Launches’ columns. An almost similar cutter suction hopper dredger is now nearing completion on the berth adjacent to the one from which the *St. Lawrence* was launched, this vessel being under construction for the Government of the Union of South Africa.

Following the cable of the 15th August intimating that President Taft had ordered the acceptance of the tender sent in by Messrs. William Simons & Co. to build a bucket dredger for the Panama Canal, that firm have been officially informed that they have been entrusted with the order. Their tender was no less than \$399,340—or over 50 per cent.—under that of the only American firm who tendered. It is of interest to recall that, on the last occasion on which Messrs. Simons tendered for dredging plant for the Panama Canal, their offer was considerably under the lowest American tender; but owing to a special resolution put into force by Congress at that time, the contract was not given to them. The firm have reason, therefore, to be congratulated on their success on the last occasion. The great difference in price is no doubt to some extent accounted for by the wide experience which the Renfrew firm have had in the construction of vessels of this class, of which they are the inventors and first constructors. They built the first dredger of this type for the Canadian Government so long ago as 1872.

For the Tees Conservancy Commissioners, the firm of Fleming & Ferguson, Paisley, are building a bucket ladder dredger, of special design, which will be able to dredge close up to quay walls.

This is the second vessel to be built for the same authority.

Dredgers and steam tugs are specialities of Messrs. Ferguson Brothers, Port-Glasgow, and four dredgers of from 350 to 600 tons have been launched this year. On the 1st September they launched, with machinery on board, the powerful twin-screw tug *Beam*, the second of three similar vessels, for the Port of London Authority. For the Clyde Shipping Company, they have contracted to build and engine a powerful screw tug similar in dimensions to other tugs built for this company. The present, in fact, is the seventh tug which they have built for the same company within the last six years.

Turning now to the East Coast of Scotland, the tonnage output of all three rivers—the Forth, Tay, and Dee—for the third quarter of the year amounted to the respectable figure of 8,100 tons, made up of 18 vessels. As many as 17 of these, aggregating 6,900 tons, were from Dee yards, no launch whatever having taken place on the Forth or Tay during July and August, and only one in September—a 1,200-ton Ellerman liner from the yard of Messrs. Ramage & Ferguson, Leith. The output of the three rivers for the nine months of the year reaches a total of 22,750 tons, *viz.*, 7,285 tons for the Forth, 5,355 tons for the Tay, and 10,110 tons for the Dee, made up of 62 vessels, mostly of small tonnage, such as trawlers and drifters.

One very outstanding contributory item to the period’s output was the steamer *Intaba*, launched on the 6th September by Messrs. Hall, Russell & Co., Aberdeen, for the passenger and cargo service between London and Natal of Messrs. John T. Rennie & Son, Aberdeen. The vessel, which is of 4,700 tons—curiously enough almost exactly equivalent to the whole previous eight months’ output of the Dee—is not only the largest steamer ever launched at Aberdeen, but the first constructed there on the Isherwood longitudinal system, and also the first built anywhere on that system to have a Board of Trade passenger certificate. Classed also at Lloyd’s 100 A1, she has two complete decks, poop, long bridge, and topgallant forecastle, with a boat deck extending the whole length of the bridge. She has accommodation for 68 first and 60 second-class passengers, and will be propelled by triple expansion engines, of 3,000 I.H.P., made by the builders.

As regards new work for East of Scotland yards, the report for the quarter is, on the whole, moderately satisfactory. The Caledon Company, Dundee, are to build a 2,000-ton steamer for the Dundee, Perth and London Shipping Co., and also a paddle steamer 165ft. long for Brazilian

owners. Messrs. Ramage & Ferguson, Leith, are to build a steamer of 2,750 tons D.W. for the

Union Steamship Co. of New Zealand, and a steam yacht of 700 tons for a foreign owner.

BELFAST.

The volume of work which the shipbuilders of Belfast have on hand is very large, the industry on the Lagan being in a highly flourishing state. Unaffected by the boilermakers' lock-out, business has been steady during the past quarter, which has witnessed several important changes in the managerial staff at Messrs. Harland and Wolff's establishments in consequence of the retirement from active business life of the Rt. Hon. A. M. Carlisle. Both this firm's yards are fully engaged, all the eight building berths being occupied with vessels in course of construction. In the North Yard the 45,000-ton White Star liners *Olympic* and *Titanic* are being built, and both are in an advanced stage. The former has been painted, and workmen are making preparations for her launch, which is to take place on the 20th October. The *Titanic* has been completely plated, and will be put into the water early in 1911—probably by the end of March. In connection with these vessels Messrs. Harland and Wolff are spending £10,000 on strengthening the Victoria Wharf, and the Harbour Commissioners are spending over £50,000 on dredging the channel, laying down railway lines to the fitting-out wharf, providing a turning basin in the harbour, etc., while the Victoria Channel is to be deepened 3 feet. On the third slip in the North Yard is the P. & O. liner *Meloja*, which is well forward. Although she is a 14,000-ton vessel, she looks a pygmy beside the *Olympic*.

In the South Yard there are two single-screw steamers for the Eastern trade of the Hamburg-Amerika Line. They are still in the early stages, and are practically replicas of the *Preussen*, launched on the 25th August for the same company by Messrs. John Brown & Co., Clydebank. Their gross tonnage will be about 8,000 and their deadweight capacity about 12,000 tons. The frames of a new steamer for the intermediate service of the Union-Castle Line have been erected, and in the same yard a fine 11,400-ton vessel for the Aberdeen White Star Line's Australian passenger trade is being rapidly completed to replace the s.s. *Pericles*, lost off the Australian coast. This vessel will be named the *Demosthenes*, and her propelling machinery will be a combination of reciprocating and turbine engines. She is a sister ship to the *Themistocles*, launched from the adjacent slip on the 22nd September. The *Themistocles*, which will be propelled by twin-screw reciprocating engines,

will sail from London on her maiden voyage on the 15th February, 1911. An order has also been received from the Belfast Steamship Company for a fast passenger steamer for the service to Liverpool. The new vessel is to be larger than the *Heroic* and *Graphic*, and will be built in the South Yard.

During the quarter Messrs. Harland & Wolff delivered to her owners the s.s. *Pakeha*, a fine ship of 8,000 tons for the Shaw, Savill and Albion Company's colonial service; while the s.s. *Gloucestershire*, 8,100 tons, for the Bibby Line, of Liverpool, was fitted out, and leaves on her trials early in October. The principal repair job was the s.s. *Leopoldville*, of Antwerp, which was in hands for overhaul. She is a handsome steamer, built at Queen's Island in 1908 and owned by the Cie. Belge Maritime du Congo.

Messrs. Workman, Clark & Co., who are very busy, are at present extending their North Yard, ten acres of ground having been acquired from the Harbour Board. They have a great variety of work on hand, the principal contract being that from Messrs. Alfred Holt & Co., of Liverpool, for the three 10,000-ton steamers to be put into the Australian passenger trade. This new service will utilize Fishguard as a port of call. The first of these ships—the *Aeneas*—was launched in August by Lady Reid, wife of the Rt. Hon. Sir George Reid, K.C.M.G., High Commissioner of the Commonwealth in London. The second vessel, to be launched in October or November, will be named the *Ascanius*, and the third the *Archises*. During August and part of September the Holt liner *Agamemnon* was in the hands of Messrs. Workman, Clark & Co. after being ashore. She was partly re-bottomed in the Alexandra graving dock. Other contracts include new steamers for Messrs. J. P. Corry & Co., of London, the Houlder Line, of London, Messrs. Lamport and Holt, of Liverpool, Elders & Fyffes' fruit trade to the West Indies, etc. The Houlder liner *Urmston Grange* was also overhauled during the period under review.

Messrs. McColl & Co. have carried out several repair contracts, the principal of which was on the French barque *Dupleix*, extensively damaged in a collision on the Atlantic. Her overhaul was completed in the middle of September, and she left for Newport to load for the West Coast of South America.

The new graving dock constructed by the

Belfast Harbour Commissioners—the largest dry dock in the world—is now practically completed. The dock is expected to be ready for use by about the time these lines appear in print, although the formal opening may not take place before the

beginning of next year. The dock is 850ft. long, but is capable of being extended another 150ft. It is 100ft. wide on the floor, and 42ft. 6in. deep from coping to floor. The work of construction has taken seven years, and has cost £350,000.

THE TYNE.

At the time of writing, shipbuilding on the Tyne is practically at a standstill on account of the lock-out of the members of the Boilermakers' Society by the firms connected with the Shipbuilding Employers' Federation. New work which is thus being more or less delayed includes the British battleship *Monarch*, the British second-class protected cruiser *Weymouth*, and the Brazilian battleship *Rio de Janeiro* at Elswick; the Cunard liners *Franconia* and *Laconia*, the 32,000-ton floating dock for the British Admiralty, and two British destroyers at Wallsend; the British battleship *Hercules* at Jarrow; and five British destroyers at Hebburn. During the past month (September) only six vessels were launched by Tyne shipbuilders, as compared with twelve during September, 1909. The total output for the first nine months of this year is represented by 67 vessels, as against 81 in the corresponding period of last year.

Brazil's third battleship under her programme of 1906—the *Rio de Janeiro*, now in an early stage of construction by Sir W. G. Armstrong, Whitworth & Co.—is a much larger vessel than the *Minas Geraes* and *São Paulo*, her two predecessors. On the authority of Admiral Bacellar, chief of the Brazilian Naval Commission, she will displace nearly 32,000 tons, and will mount twelve 14-inch guns. It is understood that she is 680 feet long, by 92 feet beam, and, in addition to the main armament of 14-inch weapons, will carry twenty-eight 6-in. and 4-in. guns. If these figures are correct, the vessel will be heavier and more formidably armed than any other battleship at present under construction.

The extensive scheme about to be carried out by Sir W. G. Armstrong, Whitworth & Co., at Low Walker, has been one of the chief topics of conversation in Tyne shipbuilding circles during the past few weeks. At a recent meeting of the Newcastle City Council it was unanimously agreed to lease to the company about 70 acres of land at Walker, with a river frontage of about half a mile. It may be recalled that some months ago it was announced that the Armstrong Company would construct a new shipyard at Walker. At that time they had taken over land previously occupied by another company, and

later it was converted into a naval equipment yard, to which the war vessels launched at Elswick were brought for final fitting out. The area was about 25 acres, and now, as already indicated, the negotiations with the Newcastle Corporation have resulted in a large additional tract of land being secured, on which battleships and cruisers will be constructed.

The Armstrong Company have let the contract for laying out the whole of the new shipbuilding yard and works at Walker to Messrs. Edmund Nuttall & Co., Manchester; and the levelling of the surface, the removal of the large ballast heaps now on the site, the laying out of new berths, etc., will be taken in hand forthwith. It is reported that the contract price approaches £160,000, but something like half a million sterling will have to be expended on the site before any constructive work can be commenced. The work has been so planned that the first building berth may be ready in eighteen months. Workmen's and other dwellings will also be erected at Walker, and on the whole the residents in the mid-Tyne district seem to have good grounds for anticipating greatly increased prosperity for Walker.

Messrs. R. and W. Hawthorn, Leslie and Co., St. Peter's, who have in hand the propelling machinery of the British battleship *Monarch* (27,000 H.P.), the unarmoured cruiser *Active* building at Pembroke (18,000 H.P.), and the five destroyers under construction at their Hebburn yard, have achieved another notable success with the engines of the unarmoured cruiser *Blanche*. The vessel, which was built at Pembroke, is the third of the *Boadicea* class, and has a displacement of 3,360 tons. The order for the machinery was placed in the hands of the contractors on the 19th April, 1909, who undertook to construct the same, run the trials, and hand over the machinery by October, 1910. The trials were all satisfactorily completed, and only the opening up remained to be done, by the evening of the 27th August. This is believed to be the shortest period in which engines of this type and power have been completed. The machinery consists of an installation of Parsons turbines having h.p. ahead and astern turbines on each of the two

wing shafts and l.p. ahead and astern turbines on each of the two inner shafts. As in the case of the machinery of the "Town" cruisers, separate cruising turbines are dispensed with. Steam is supplied by twelve Yarrow boilers, constructed by Messrs. Hawthorn, Leslie & Co. The designed speed was 25 knots, with 18,000 shaft horse-power.

The steaming trials consisted of a thirty hours' run, divided into two periods of eight hours at 15,000 S.H.P. and twenty-two hours at 11,000 S.H.P., and an eight hours' full-power run. On the first eight hours' trial the average S.H.P. was 15,274, the mean revolutions of the four propellers being 472.6 per minute. During this trial measured mile runs were made, which gave a mean speed of 24.4 knots, with 15,473 S.H.P. and a coal consumption of 1.48lb. per S.H.P. per hour. On the twenty-two hours' trial, measured mile runs were again taken, when the speed averaged 23.33 knots, with 11,000 S.H.P. The coal consumption for this period of twenty-two hours was 1.78lb. On the full-power trial, the mean S.H.P. was 18,542 and the revolutions 502.7, while the coal and oil consumption together equalled 1.58lb. of coal. On the measured mile runs at full power, the speed averaged 25.67 knots, with 19,755 S.H.P. and 516 revolutions.

New contracts received by Tyne firms during the quarter under review include the following:—A small fast unarmoured cruiser for China, and a cargo steamer of 10,000 tons D.W. for the Clan Line, Glasgow, by Sir W. G. Armstrong, Whitworth & Co.; a cargo steamer of between 7,000 and 8,000 tons D.W. for Sir John R. Ellerman on account of the Bucknall Steamship Line, and two 14-knot passenger and fruit-carrying vessels for the Vaccaro Brothers' Steamship Co., Glasgow, by Messrs. Swan, Hunter, & Wigham Richardson; a large cargo steamer for the Ellerman Lines, Limited (the third in hand for these owners) by Palmers Shipbuilding & Iron Co.; and a steamer of 7,300 tons D.W. for Messrs. W. Holzapfel and Co., Newcastle, by the Northumberland Shipbuilding Co. Messrs. J. T. Eltringham and Co., South Shields, have also secured an order from the British Admiralty for three double-ended boilers, understood to be for H.M.S. *Hecla*, a floating repairing dépôt for submarines.

Ship-repairing on the Tyne has been somewhat dull during the past quarter, and recent labour troubles have certainly not helped matters. One of the most interesting and extensive jobs now in hand is the cargo steamer *Dunbeith*, which is at the dry docks department of Messrs. Swan, Hunter, and Wigham Richardson. After lying four years on the rocks at Angra Pequena, in German South-West Africa, the vessel was

recently salved, and brought to the Tyne under the command of Captain John W. Squance, of Sunderland.

Smith's Dock Company, South Shields, during the period under review, have overhauled the following vessels:—*Metis*, *Blanka*, *Oldenburg*, *Irina*, *Rondo*, *Horda*, etc.; while at their Bull Ring Docks, North Shields, the oil steamers *Pinna*, *Strombus* (fitting oil-burning installation), *Luciline*, *Oriflamme*, *Geestemunde* (heavy bottom damage), and others have been in hand. The company have now let the contract for the construction of their large new graving dock at North Shields to Sir John Aird & Co., London. The plans and designs have been prepared by Mr. J. Mitchell Moncrieff, Newcastle.

Prior to the departure from the Tyne of the large new steamer *Indrabarah*, referred to in our Launches' columns, an interesting demonstration was given by the Imperial Light, Limited, of 123, Victoria Street, London, of their system of lights for loading and discharging cargo; and the numerous superintendents and others present expressed their appreciation of the extraordinary efficiency, simplicity, and cheapness of the installation. The system fitted on board the *Indrabarah* consists of powerful lights on each of the four masts for lighting the decks and holds, together with four portable lights, which may be fixed to the ship's sides, for lighting the deck side or barges alongside. These lights are supplied from portable generators about 3ft. 6in. high and 36in. diameter, which stand at the foot of the masts, and are connected to special fixed piping running up the masts for about 25ft. to the burner arms, which are carried on brackets connected in the same way to the fixed piping. These burner arms and generators can be removed and stowed away when not required. The flame is absolutely wind-proof, and the light can be thrown in any direction. Each burner is of 1,500 c.p., and the generators are designed to run these lights for about eight hours. The decks of the *Indrabarah* were brilliantly illuminated, and the demonstration proved very conclusively the advantage of the "Imperial" lights over some electric-light clusters which happened to be running at the same time. By means of the portable lights it was possible to throw a light anywhere in the holds, and with the mast lights it was also possible to throw a light as far as some buildings on the opposite side of the river. The company, in addition, showed a number of small hand lamps for use in the engine room or for examining any part of the decks or holds. The *Indrabarah*, it is interesting to note, is the third vessel equipped by the Imperial Light, Limited, for the same owners—the Indra Line, of Liverpool.

THE WEAR.

During the three months ending 30th September, a total of 21 vessels, representing 60,977 tons, have been launched by Wear shipbuilders, as compared with 19 vessels of 56,578 tons during the second quarter of the year, and 17 vessels of 40,825 tons during the first quarter. The total output so far for this year, therefore, is 57 vessels of 158,380 tons, as compared with 41 vessels of 87,805 tons for the corresponding period of 1909, and 26 vessels of 67,760 tons for the same period of 1908. The figures for the three months on which we are now entering, however, will be adversely affected by the lock-out of the boilermakers, as at the time of writing very little work is being done in the Sunderland shipyards.

As regards new contracts received by Wear shipbuilders during the past three months, the following are the principal bookings:—Sir James Laing & Sons, a vessel to carry emigrants and with a D.W. capacity of about 5,000 tons, capable of a speed of 16 knots, for Messrs. A. A. Embiricos

and Co., London; Messrs. William Doxford and Sons, a steamer of large carrying capacity for the Clan Line, Glasgow; Messrs. Osbourne, Graham and Co., a cargo steamer of 2,200 tons D.W., to be built on the patent Ayre-Ballard system, for Messrs. A. Grönquist & Co., Newcastle, and a shade-deck passenger steamer of moderate dimensions for the South American coasting trade; and Messrs. William Pickersgill & Sons, a cargo steamer of 3,700 tons D.W. for Spanish owners.

Shortly after our Summer Number went to press, the death occurred at West Hall, Whitburn, near Sunderland, of Mr. Robert Thompson, the veteran Wear shipbuilder. The deceased, who was in his 91st year, was head of the well-known firm of Robert Thompson & Sons, Sunderland. Before advancing years compelled his retirement, he took an active part in the commercial life of the town, and was chairman of the River Wear Commissioners for many years.

TEES AND HARTLEPOOL.

The end of another quarter leaves little of interest to chronicle as regards shipbuilding on the Tees and at Hartlepool. Enquiries for new tonnage are, at the time of writing, not very numerous; but as the freight market appears to show a slight improvement in certain directions, there are hopes of somewhat busier times when the wretched lock-out of the boilermakers and other labour troubles are ended.

At Middlesbrough, Sir Raylton Dixon & Co. have a fair amount of new tonnage in hand, and are understood to have secured further work recently. Messrs. W. Harkess & Son have contracted to build two vessels for the Ellerman Lines, one of 4,000 and another of 2,500 tons D.W. Smith's Dock Company, whose recently issued balance sheet showed a successful year's work, have launched during the quarter a twin-screw grain barge, two screw trawlers, and three screw cargo steamers of small dimensions. They have had for repairs a good many large vessels, notably the *Axenfels* of the Hansa Line, several British India steamers, the oil steamer *Iroquois*, and the Atlantic oil barge *Navahoe*.

At Stockton, Messrs. Craig, Taylor and Co., Richardson, Duck & Co., and Ropner & Sons have each three vessels under construction. The last-named firm early in August received from Messrs.

R. Chapman & Sons, Newcastle, an order for a cargo steamer of 10,000 tons D.W., intended for the Eastern trade. Messrs. Blair & Company are at present fairly well off for work.

Residents on the Tees, the home of the Isherwood system of construction with longitudinal framing, will be interested in the fact that a total of 62 vessels, representing 243,500 gross register tons, have been, are being, or are under contract to be built on this system. This is all the more remarkable when one considers that the first ship so constructed—the oil steamer *Paul Paix*—was completed by Messrs. R. Craggs and Sons, Middlesbrough, so recently as November, 1908.

At Hartlepool, Messrs. William Gray and Company have been successful in securing a contract for the construction of a single-deck steamer of 6,200 tons D.W. This order was placed by Messrs. Vogt and Maguire, of Liverpool, and is on account of Greek owners. The propelling machinery will be constructed at the Central Marine Engine Works of Messrs. Gray. Irvine's Shipbuilding & Dry Docks Co. have contracted with Mr. J. A. A. van Med, of Rotterdam, to build a vessel of 5,500 tons dead-weight.

BARROW-IN-FURNESS.

The shipbuilding trade of Barrow is feeling the effect of the boilermakers' lock-out, in the sense that much of the work in hand is at a standstill. The apprentices alone are working, and consequently not much progress is being made. The important naval contracts which have been entrusted to Messrs. Vickers, Sons and Maxim are of an urgent character, and it is quite on the cards that when work is resumed, under whatever agreement may eventually be arrived at with the men, overtime by the aid of electric light will have to be resorted to in the shipbuilding department. A double shift of men is required in the boiler shops under the present circumstances, so heavy are the orders booked. The boilers of the battleship-cruisers *Lion* and *Princess Royal* alone are big orders for any firm, but they do not by any means represent the whole of the work of this nature at present occupying attention in the boiler shops of the Vickers Company, which are now probably the largest in the world.

The general opinion of the workmen locked out at Barrow is that extreme measures should in the first instance have been avoided by the men on the Tyne and Clyde resuming work pending a settlement of the matters in dispute, and here the men are anxious to see an agreement concluded as early as possible that will be equally

binding on both sides. The lock-out has unfortunately resulted in the discharge of well on to a thousand labourers, mostly married men with families. Funds are being collected, however, by friends who are anxious to help these victims of the lock-out to tide over their present difficulties.

Much satisfaction has been felt locally at the safe arrival at Rio de Janeiro of the large floating dock built here, after its journey of 6,000 miles in charge of the two powerful Dutch tugs.

The Admiralty airship under construction is nearing completion, and already officers have been appointed and are expected to arrive at Barrow shortly. In the meantime the supply of hydrogen necessary to inflate the balloons of the airship has been received, and other indications are not wanting that in the course of the next few weeks the remarkable vessel will take her first flight. The utmost secrecy is still observed regarding the airship, with the result that public interest in her shape and fitments has been increased. Residents will ere long have an opportunity of noting her external appearance, although it is not at all probable that any particulars of her machinery will be allowed to leak out.

THE MERSEY.

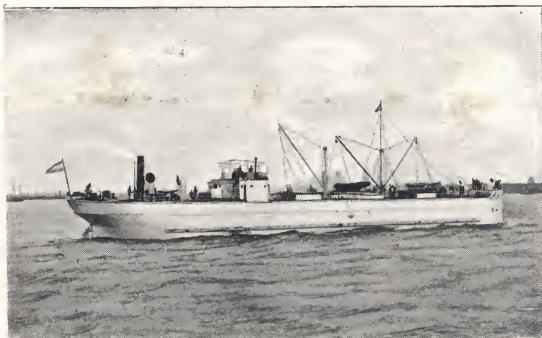
Liverpool at present does not construct a very appreciable proportion of the world's new tonnage, although no port places more shipbuilding orders in other centres. But if the output is small in volume, the vessels produced maintain the high standard of excellence for which Mersey-built craft of 25 to 50 years ago were noted, and shipbuilding prospects on the river continue to improve. Messrs. Cammell, Laird & Company's yard and works at Tranmere Bay and Woodside are receiving a much better share of patronage than has fallen to them since the completion of the ambitious scheme of enclosing the Tranmere Bay mud site and converting it into one of the most up-to-date shipyards in the world.

The shipyard lock-out has not greatly affected work at Birkenhead; as although about 1,000 men are idle, Messrs. Cammell, Laird & Co. have a good supply of men on the ships under construction. On this occasion the Mersey has not suffered to the same extent as usual when such troubles arise, for this district in the past has

been very unfortunate in regard to shipbuilding disputes. In fact, a well-known builder some years ago stated it was owing to the difficulty of securing steady labour that shipbuilding work had practically left the port.

The first of the two steamers ordered from Messrs. Cammell, Laird & Co. by the London and South Western Railway Co.—the *Cæsarea*—has been delivered, and the fitting out of the second—the *Sarnia*—is progressing. The Nelson liner *Highland Brae*—the second of the four ordered from the Mersey firm by Messrs. H. & W. Nelson—is fitting out afloat, while the last two are on the stocks. Of the three British destroyers ordered under the 1908-9 Programme, the *Wolverine* and *Renard* left for Portsmouth in the first week in September, and the *Racoon*, at the time of writing, is expected to leave early in October. Other naval work in hand includes the two British destroyers of the improved *Acorn* class ordered under the 1910-11 Programme, to be named the *Lapwing* and *Lizard*,

and the four destroyers for the Argentine Government, while the 32,000-ton floating dock for the British Admiralty grows rapidly. Tonnage completed during the quarter comprises large and small barges for special trades, including the meat barge *La Blanca*, a vessel 189ft. B.P., by 36ft., by 22ft., which left her builders' yard on the 4th August.



The Meat Barge "La Blanca."

In the matter of repair work, the Mersey has been able to attract some jobs to the port as well as to retain others which might have been expected to go elsewhere under the stress of keen competition. Liverpool's possession of the only graving docks suitable for the largest battleships and liners brings business in this direction which cannot be done elsewhere on the West Coast. Messrs. Cammell, Laird & Co., H. & C. Grayson, David Rollo & Son, Gordon Alison & Co., and the Mersey Engine Works have among them, during the period under review, dealt with repairs to the following vessels :—*Quernmore*, *Sir Walter Raleigh*, *Mona's Isle*, *Duchess of Devonshire*, *Eugene Schneider*, *Khorazan*, *Batanga*, *Bernard*, *Tudor*, *Portland*, *Llanelli*, *Lough Fisher*, *Tottenham*, *Ernesto*, *Winifreda*, *Assiout*, *Nicholas*, *Edward Dawson*, *Diana*, *Montgomeryshire*, *Highland Laird*, and *Talisman*.

Messrs. H. & C. Grayson, Limited, shipbuilders, of Liverpool, are at present executing a large number of orders from British and foreign firms for McKay's patent instantaneous engaging and disengaging gear for ship's boats, of which they are the sole makers, orders in hand including, among others, equipments for the vessels now building for the Cunard Line. The claims made for this type of boat gear over others are that its construction is simple and entirely without

complicated mechanism, it is always ready for immediate use the stem and stern being simultaneously disengaged, it can be used in the roughest seas, and it cannot become disengaged until the boat is waterborne ; while the cost is so small that it must commend itself to all shipowners, shipbuilders, and superintendents. The device, which has been approved by the Board of Trade, has already been long enough in practical use on some of the principal liners to prove its merits, and the opinion of its users is that it is without doubt the most reliable gear yet introduced for the purpose. Certainly the claims made on its behalf would appear to justify the prediction that in future McKay's boat gear will be regarded as a necessary part of the equipment of all vessels of good class.

It is worthy of mention that the novel design of winch made by Messrs. David Wilson's Patent Noiseless Winch Co., of Liverpool, is meeting with much acceptance by owners of passenger and cargo steamers alike. Already quite a long list of the principal steamship lines and shipbuilders have ordered winches of this type for their new vessels, while among orders recently received are those for the ten new Nelson liners and for three ships in course of construction at Earle's shipbuilding yard, Hull, all of which are to be fully equipped with Messrs. David Wilson's winches. The most striking feature of these winches is that they are quite noiseless, a result attained by the substitution of sprocket wheels and chains in place of the usual and noisy method of direct coupling of the gear wheels. The chains operate on three-fourths of the main barrel wheel, thus distributing the weight nearly all over this wheel, instead of working with one tooth as in the ordinary winch. The makers claim that with a steam pressure of 40lb. their winch will lift as much as the ordinary apparatus working at 60lb. The chains are of the roller type, in which the wear comes entirely on the whole length of the pin, and are case-hardened and tested to 15 tons breaking strain. The patentees have gone even further and devised a compound roller chain, which has been tested to a strain of 32 tons, thus still further ensuring even tension, more direct drive, and absence of noise and vibration. The noiseless type of winch seems likely in the course of time to displace to a large extent those more commonly in use, more especially as the improvements can be fitted to the ordinary steam winch at a very moderate cost, and without necessitating its removal from the ship's deck.

A Planimeter Method for the Calculation of Stability.

By ALEX. URWIN, Naval Architect.

THOSE who have to make stability calculations without the aid of an integrator will find convenient the following method of using an ordinary planimeter for the purpose, while those who have no need for the method will no doubt be interested in a new way of tackling an old problem. Although the time taken is longer than if an integrator were employed, the degree of accuracy will be found equivalent.

The principle of the method is that if a curve $o b e$ (Fig. 1) be drawn so that the displacement

(which represents the total displacement) will give the distance of the centre of buoyancy of the total displacement from $d e$. For if $a b$ represents the displacement up to $A B$, and $a_1 b_1$ represents the displacement up to $A_1 B_1$, then the displacement of the layer $A B B_1 A_1$ is represented by the difference in length of $a b$ and $a_1 b_1$, that is by $b_1 c$, and the area of the shaded strip $y \times b_1 c$ is the moment of the layer about $d e$. The total area $o b e d$ is the sum of all such strips, and it follows that this area represents the moment of the immersed part of the vessel about $d e$.

To illustrate the application of this principle to the making of cross curves of stability, the method has been adopted in obtaining the stability levers for the flush-deck vessel whose sections are shown in Fig. 2. This drawing shows the stability sections, together with the integral curves for different draughts when the vessel is inclined to 45 degrees. The length for displacement (237.75 feet) has been divided into 15 equal parts, the integration of the areas for displacement being performed by the trapezoidal rule. To check the accuracy of this rule, the total upright displacement has been calculated by the trapezoidal and Simpson's 2nd Rule, the results being 3,053 and 3,061 tons respectively, from which it appears that the trapezoidal rule is sufficiently accurate for the present purpose. Now by the trapezoidal rule the volume of displacement is given by:—

$$\text{Common Interval} \times (\frac{1}{2} \text{ sum of end areas} + \text{sum of intermediate areas}).$$

This rule is specially useful where the planimeter is concerned, as in most cases half the sum of the end areas equals nothing, or the end areas can be halved by inspection when going round with the planimeter. Hence, by merely running the planimeter round all the sections, a reading is obtained which is proportional to the displacement. Another advantage of this rule is that for water-lines such as $w_1 l_1$ (Fig. 2), where the length for displacement is different to the ordinary length, the trapezoidal rule can be applied without drawing out extra sections, as would have to be done if other rules were used.

The first step in the process, after preparing a body plan, is to draw upon the body plan a series

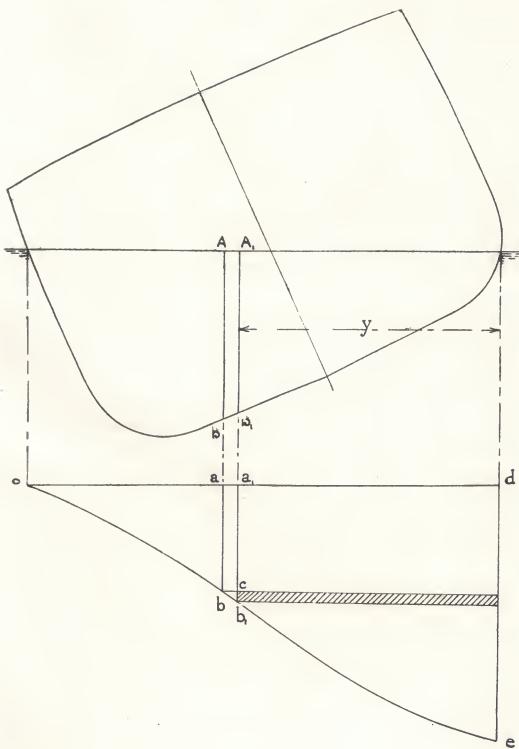


Fig. 1.

of the immersed part of the vessel to the left of any line $A B$ is represented by the ordinate $a b$, then the area $o b e d$ divided by the ordinate $d e$

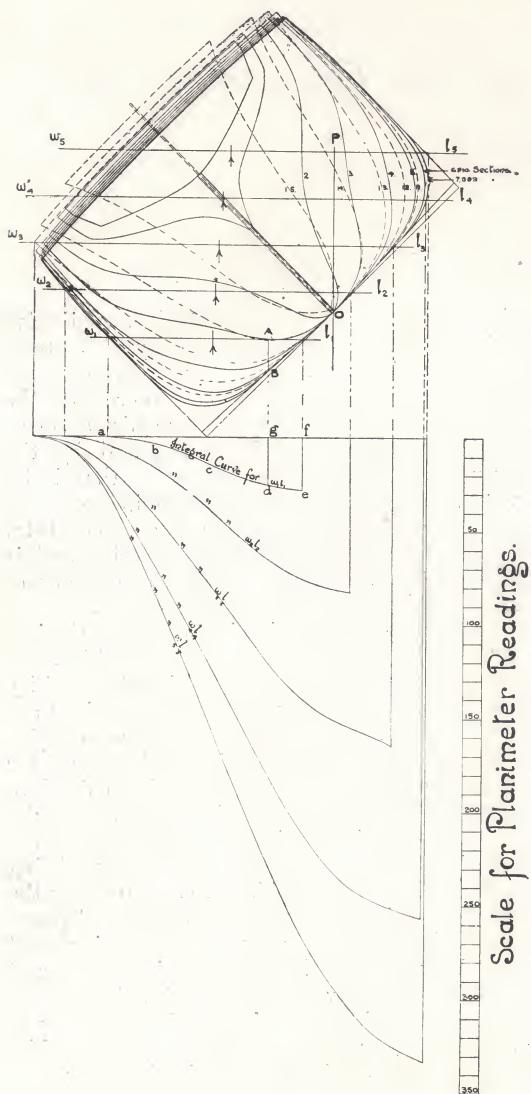


Fig. 2.

of waterlines, $w_1 l_1$, $w_2 l_2$, etc. (Fig. 2), at any required angle. Then, taking $w_1 l_1$ as an example, $A B$ is drawn square to this waterline, and the planimeter run consecutively round the underwater portion of each section to the left of $A B$. The planimeter reading, which is proportional to the displacement, is then set off at $g d$ to some

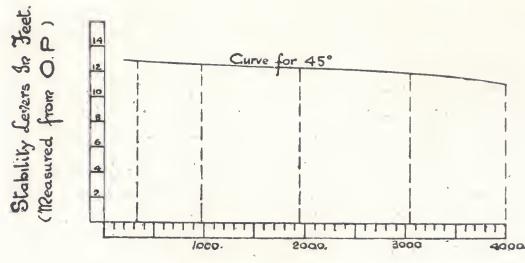


Fig. 3.

convenient scale. By repeating the process for various positions of $A B$, the curve $a b c d e f g$ can be drawn. The planimeter is now run round this integral curve and the reading noted. Then, if A = planimeter reading for integral curve,

$$A \times \text{planimeter multiplier}$$

$$\text{distance } e f$$

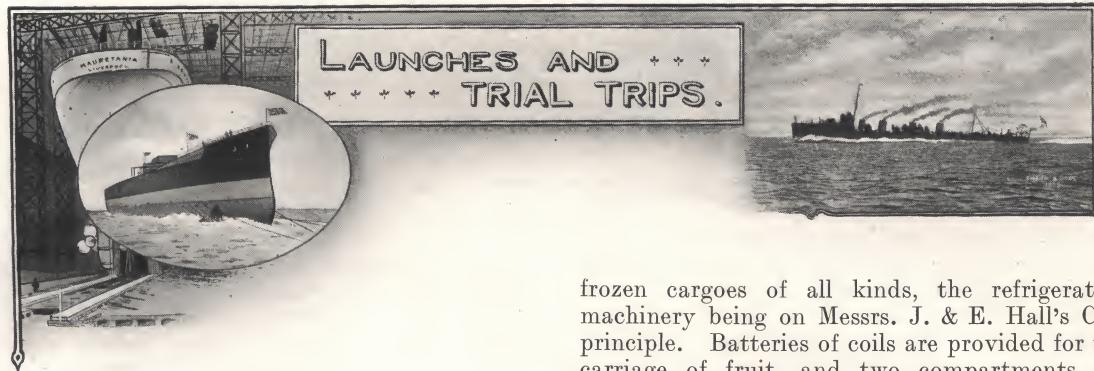
= Centre of buoyancy to left of $e f$.

This process is repeated for the other waterlines, the curves being shown in Fig. 2. The centre of buoyancy up to each waterline having thus been found and set off as shown by the arrows, their distances from some convenient line such as $O P$ can be measured and plotted with the corresponding displacement, as in Fig. 3; or if the position of the centre of gravity be drawn on the sections, the values of the righting arm can be measured and a cross curve of "G Zs" plotted. By continuing this process for different inclinations, a complete set of cross curves of stability may be drawn.



SINCE our Clyde shipbuilding notes were written, the contracts for the propelling machinery of the two battleships to be built at Portsmouth and Devonport under the 1910-11 Naval Programme

have been placed with the Parsons Marine Steam Turbine Co., Wallsend, and Messrs. R. & W. Hawthorn, Leslie & Co., St. Peter's, Newcastle, respectively.



IRELAND.

Dublin Dockyard Co., Dublin.

"Penguin." LIGHTSHIP ; 100ft. long. Built for the Irish Lights Commissioners. The vessel is constructed principally of iron, and to resist the action of sea-water the scantlings are specially heavy. The lighthouse lantern contains many lights and reflectors, revolved automatically by clockwork apparatus. Launched, 8th September.

"Sieve Foy." TWIN-SCREW towing and buoy-lifting steamer, flush-deck type ; 100ft., by 22½ft., by 10¾ft. The propelling machinery consists of two sets of compound engines and one boiler. Launched, 21st September.

Harland & Wolff, Limited, Belfast.

"Gloucestershire." TWIN-SCREW passenger and cargo steamer ; 483ft. long, by 54ft. beam ; 8,100 gross tonnage. Built for the Bibby Line, Liverpool. The staterooms are arranged on the Bibby "tandem" principle, all the rooms being lighted with sidelights from the outside. The propelling machinery, which consists of two sets of quadruple expansion engines arranged on the balanced principle, was constructed by the shipbuilders. Launched, 7th July.

"Themistocles." TWIN-SCREW passenger and cargo steamer ; 516ft. overall, by 62ft. ; about 11,400 gross tonnage. Built to the order of Messrs. George Thompson & Co., Ltd., for the Aberdeen Line. The vessel is a large cargo carrier, and her six hatches are served by seventeen winches. The holds are insulated for the conveyance of

frozen cargoes of all kinds, the refrigerating machinery being on Messrs. J. & E. Hall's CO₂ principle. Batteries of coils are provided for the carriage of fruit, and two compartments are specially arranged for the carriage of chilled beef. First and third-class passengers only are carried, the whole of the midship accommodation being devoted to the former, and the whole of the after accommodation to the latter. The saloon passengers are quartered on the bridge and awning decks, while the boat deck is reserved to them for an additional promenade. The lounge, library, smoking room, and verandah café are on the bridge deck, the nursery is on the awning deck, and the dining saloon is on the main deck. The staterooms are placed on the bridge and awning decks. The bridge deck is devoted entirely to single-berth cabins, which can, however, be made inter-communicable if required, while the awning deck accommodation is composed of Bibby "tandem" cabins of large size. The cabins on the awning deck have a height of 8½ft., and those on the bridge deck 9ft. The third-class accommodation is situated on the poop, main, and 'tween decks, and comprise single, two, four, six, and eight-berth cabins. The dining room, extending the full width of the ship, seats about 250 persons. A smoking room and a general room are placed on the awning deck. The propelling machinery consists of two sets of quadruple expansion engines, and the vessel is expected to make the passage between London and Melbourne in forty days. A sister ship, the *Demosthenes*, will be launched by the same builders in a few weeks' time. She is similar in all respects to the *Themistocles*, except that she has three screws, driven by a low-pressure turbine and two sets of reciprocating engines. Launched, 22nd September.

Workman, Clark & Co., Ltd., Belfast.

"Æneas." TWIN-SCREW passenger and cargo steamer ; 509ft., by 60ft., by 40ft. The vessel has been built to the order of the Ocean Steamship Company (Messrs.

Alfred Holt & Co.), Liverpool, and is the first of a number of steamers building at Belfast and elsewhere to inaugurate a service to Australia. There are five decks—the promenade, centre-castle, upper, main, and lower—with excellent accommodation for about 300 passengers in two, three, and four-berth cabins. The cabins on the centre-castle deck are arranged on the "tandem" principle of lighting and ventilation. The dining saloon is on the second deck. A series of oak staircases lead from the dining saloon to the main entrance hall on the centre-castle deck. Leading from the after end of the entrance hall is the music room, and a smoking room is also situated on this deck, further aft. A large nursery is provided. The cargo space is divided into six holds, free of obstruction. One of the holds and the after 'tween decks are insulated for the carriage of frozen meat, dairy produce, and fruit, the refrigerating machinery being on the CO₂ principle. The two sets of triple expansion

engines, with three boilers working under forced draught, were constructed by the shipbuilders. Launched, 23rd August.

"Star of India." TWIN-SCREW passenger and cargo steamer; 486 ft. long; 7,300 gross tonnage.

Built to the order of Messrs. J. P. Corry & Co., Ltd., London, for their Star Line, and intended for the Australian and New Zealand trade. The cargo space is divided into five large holds, three of which are insulated for carrying chilled and frozen meat, and a large refrigerating plant is installed. Accommodation for a number of passengers is arranged in staterooms in the midship house, with a spacious dining saloon adjoining. The propelling machinery consists of two sets of triple expansion engines, with four boilers working under forced draught. The *Star of India* is the tenth vessel built by Messrs. Workman, Clark & Co. for the same owners. Launched, 22nd September.

SCOTLAND.

Ailsa Shipbuilding Co., Limited.

"Ilheos." TWIN-SCREW passenger steamer; 200ft., by 32ft., by 11ft. 10in.

Built to the order of Messrs. J. M. Campbell & Son, Glasgow, for the Empreza Navegacao Bahiana, Bahia. Accommodation is provided for 54 first and 24 second-class passengers. The two sets of triple expansion engines were constructed by the shipbuilders, and give the vessel a speed of 12½ knots. The *Ilheos* has been launched in four months from the receipt of the order. Launched at Troon, 7th July.

"Cannavieiras." TWIN-SCREW passenger steamer. The vessel is a sister ship to the *Ilheos*, and was built for the same owners. Launched at Troon, 12th August.

"Valenca." TWIN-SCREW ferry steamer; 116ft., by 21ft., by 7½ft. Built to the order of Messrs. J. M. Campbell & Son, Glasgow, for the Empreza Navegacao Bahiana, Bahia, and intended for the ferry traffic at Bahia. The vessel is fitted for a large number of passengers and for the carriage of a quantity of light cargo. The twin-screw triple expansion engines were constructed by the shipbuilders. Trial trip, 31st August.

Ardrossan Shipbuilding & Dry Dock Co., Ltd.

"Maianbar." TWIN-SCREW passenger and cargo steamer; 155ft., by 28ft., by 10ft. Built to the

order of the North Coast Steam Navigation Co., Sydney, N.S.W., for coasting and river work. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. Launched, 3rd September.

Barclay, Curle & Co., Ltd., Whiteinch.

"Coconada." TWIN-SCREW passenger and cargo steamer. The vessel is a sister ship to the *Chilka*, and was built for the same owners. Launched, 23rd September.

"Chilka." TWIN-SCREW passenger and cargo steamer; 403ft., by 50ft., by 25ft.

The vessel is the first of four ordered from these builders by the British India Steam Navigation Co. She has three complete decks, and is fitted with forecastle and bridge and boat decks. On the bridge deck accommodation is provided for first and second-class passengers, all the staterooms being lighted from the ship's side. A commodious dining saloon is fitted at the fore end of the bridge for first-class passengers and a similar apartment for second-class at the after end. Above this accommodation, and extending for its full length, is the boat deck, providing an extensive promenade for first and second-class passengers. At the fore end of the boat deck is a steel house containing the officers' quarters and also an entrance giving access to the accommodation below. A feature of the vessel is the provision for 2,000 native passengers,

due regard being given to the susceptibilities of Eastern caste. The two sets of triple expansion engines, constructed by the shipbuilders, take steam from four single-ended boilers. Trial trip, 28th September.

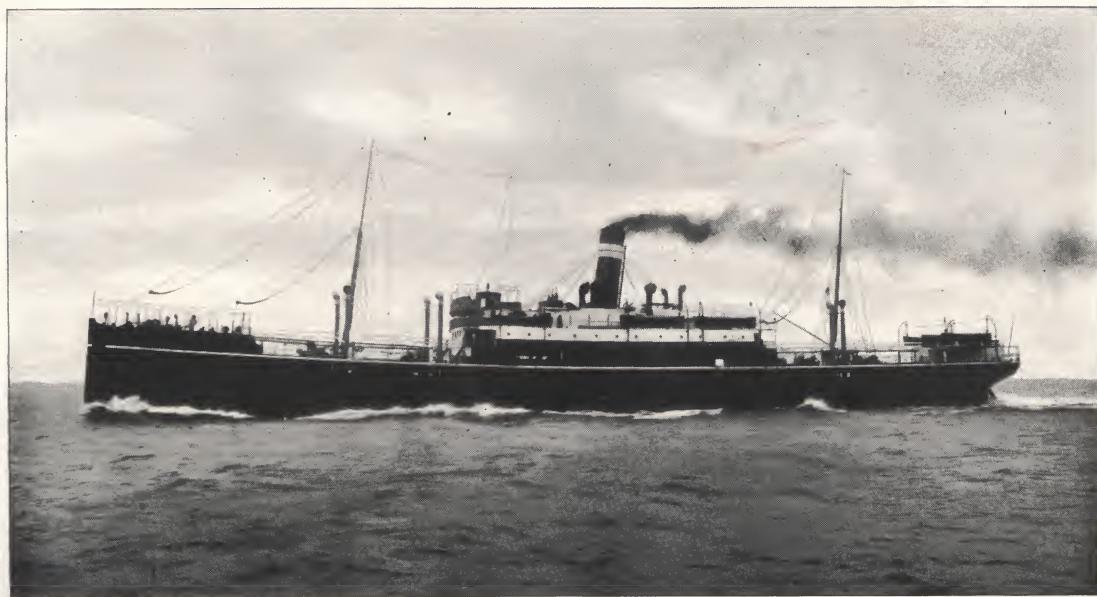
Wm. Beardmore & Co., Limited, Dalmuir.

H.M.S. "Falmouth." SECOND-CLASS protected cruiser of the improved *Bristol* type; 430ft. B.P., by 49ft. beam; 5,500 tons displacement on a normal load draught of 16½ft. Her protective deck, of 2-inch nickel steel, extends

Whitworth & Co., Elswick), and *Yarmouth* (London & Glasgow Co., Govan). The keel of the *Falmouth* was laid on the 21st February last, and she has been launched in 170 working days. Launched, 20th September.

Bow, M'Lachlan & Co., Ltd., Paisley.

"Princess Mary." TWIN-SCREW passenger steamer; 210ft., by 40ft., by 16ft. Built for the Canadian Pacific Railway Co. Accommodation is provided for about 200 passengers. The two sets of triple expansion engines were constructed



T.S.S. "Chilka."

the full length of the ship, completely covering all machinery, boilers, magazines, and other vital parts. There is a continuous double bottom, subdivided for the storage of oil fuel. The primary battery is composed of eight 6-inch guns, and the vessel carries two 21-inch torpedo tubes. The Parsons turbine propelling machinery drives four shafts, steam being supplied by twelve Yarrow small-tube boilers, and both engines and boilers have been constructed by Messrs. Beardmore. The vessel and her machinery have been designed to maintain a speed of 25 knots. The *Falmouth* is the first to take the water of the four cruisers of the improved *Bristol* class ordered by the British Government in October, 1909, the others being the *Dartmouth* (Messrs. Vickers, Sons & Maxim, Barrow), *Weymouth* (Sir W. G. Armstrong,

by the shipbuilders, and will give the vessel a speed of about 15 knots. Launched, 21st September.

John Brown & Co., Ltd., Clydebank.

H.M.S. "Acorn." OCEAN-GOING torpedo-boat destroyer; 800 tons displacement. The *Acorn* is the first of the three destroyers placed with Messrs. Brown under the Naval Programme of 1909-10. The vessel, like her two sisters, will be propelled by Brown-Curtis turbines. Launched, 1st July.

"Preussen." CARGO steamer; 470ft., by 58ft., by 36½ft.; about 8,000 gross tonnage; about 12,000 tons deadweight. Built to the order of the

Hamburg-Amerika Line, for their Eastern trade. Launched, 25th August.

H.M.S. "Alarm." OCEAN-GOING torpedo-boat destroyer. The vessel is a sister ship to the *Acorn*. Launched, 29th August.

H.M.S. "Brisk." OCEAN-GOING torpedo-boat destroyer. The vessel is a sister ship to the *Acorn*. Launched, 20th September.

Caledon Shipbuilding & Eng. Co., Ltd., Dundee.

PASSENGER and cargo steamer ; "Royal Scot." 301ft., by 38ft., by 19 $\frac{1}{4}$ ft. Built to the order of the London and Edinburgh Shipping Co., Leith, for trade between Leith and London. The triple expansion engines were constructed by the shipbuilders. On the trial, which took place on the 31st August, a mean speed of 19 knots was attained on the measured mile.

Campbeltown Shipbuilding Co., Campbeltown.

CARGO steamer, well-deck type ; "Bore." 2,000 tons deadweight. Built for the Svea Company, Stockholm. The propelling machinery was constructed by Messrs. J. G. Kincaid & Co., Greenock. Launched, 30th September.

Clyde Shipbldg. & Eng. Co., Ltd., Port-Glasgow.

CARGO steamer ; 345ft., by "Szent Isvant." 45 $\frac{1}{2}$ ft., by 25ft. 2in. Built for the Royal Hungarian Sea Navigation Co. "Adria" Ltd., Fiume. The propelling machinery was constructed by the shipbuilders. Launched, 8th September.

Charles Connell & Co., Limited, Scotstoun.

PASSENGER and cargo steamer ; "Explorer." about 8,000 gross tonnage. Built for Messrs. Thomas and James Harrison, Liverpool. Launched, 6th September.

Wm. Denny & Brothers, Dumbarton.

TRIPLE-SCREW passenger and cargo steamer ; 484ft., by 62ft., by 35ft. Built for the New Zealand Shipping Co., London. Like the *Otaki*, constructed by the same builders two years ago, the *Rotorua* is fitted with a combination of reciprocating and turbine engines. The steam is first admitted to each of two triple expansion engines driving twin screws, and then passes to a Parsons low-pressure turbine driving the centre screw. Launched, 9th July.

"Chindwin." PASSENGER and cargo steamer ; 445ft., by 55ft., by 31ft. 4in. Built to the order of Messrs. P. Henderson & Co., Glasgow, for their Rangoon trade. Accommodation is provided for over 100 passengers. In order to facilitate the stowage of bulky cargo, the hold pillaring has been arranged on the "built pillar and girder" principle, which does away with the closely spaced round stanchions and leaves large roomy holds. The propelling machinery was constructed by the shipbuilders. Launched, 10th August.

Robert Duncan & Co., Port Glasgow.

CARGO steamer, single-deck type ; "Lucistan." 5,000 tons. Built for Messrs. W. S. Miller & Co., Glasgow. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. Launched, 10th August.

Fairfield Shipbuilding & Eng. Co., Ltd., Govan.

TWIN-SCREW passenger "Princess Adelaide." and cargo steamer ; 290 ft., by 46 ft., by 32 $\frac{1}{2}$ ft. Built to the order of the Canadian Pacific Railway Company, for their passenger and package freight service between Seattle, Vancouver, Victoria, and Skagway. Accommodation is provided for 240 first and 960 second-class passengers, and on the lower deck aft there is a restaurant to seat 98 persons. A special feature of the vessel is the observation room on the promenade deck forward. The propelling machinery consists of two sets of four-cylinder triple expansion engines, taking steam from six boilers and giving the vessel a speed of 17 $\frac{3}{4}$ knots. Launched, 5th July.

H.M.S. "Goldfinch." 27-KNOT ocean-going torpedo-boat destroyer ; 920 tons displacement. The *Goldfinch* is the last of the three destroyers placed with the Fairfield Co. under the Naval Programme of 1909-10. The Parsons turbine machinery is of 13,500 H.P. Launched, 18th July.

Ferguson Brothers, Port-Glasgow.

TWIN-SCREW tug. Built for the "Beverley." Port of London Authority, and specially adapted for working in the London docks. The vessel is the first of three which Messrs. Ferguson Brothers are at present building for the same owners. The two sets of compound surface-condensing engines, constructed by the shipbuilders, develop over 1,000 H.P.,

and take steam from two Babcock and Wilcox water-tube boilers. Trial trip, 24th August.

"Beam." TWIN-SCREW tug. The vessel is a sister ship to the *Beverley*, and was built for the same owners. Launched with machinery on board, 1st September.

Fleming & Ferguson, Ltd., Paisley.

"Nessie." STEAMER. Built to the order of the Ailsa Craig Granite Quarries, Glasgow, for the coasting trade. Launched, 26th July.

John Fullerton & Co., Paisley.

"Clydemhor." CARGO steamer; 1,050 tons deadweight. Built for Mr.

J. B. Couper, Glasgow. The triple expansion engines, of 850 I.H.P., were constructed by Messrs. Ross and Duncan, Govan. Launched, 8th September.

Greenock & Grangemouth Dockyard Co., Ltd.

"Barshaw." CARGO steamer; 800 gross tonnage. Built to the order of Messrs. Paton & Hendry, Glasgow, for the coasting trade. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. Launched at Greenock, 28th July.

"Broompark." CARGO steamer; 245ft., by 37ft., by 17ft. 5in.; 2,200 tons deadweight. Built for the Denholm Line Steamers, Ltd. The propelling machinery was constructed by Messrs. Dunsmuir & Jackson, Glasgow. Trial trip, 16th September.

Hall, Russell & Co., Ltd., Aberdeen.

"Intaba." PASSENGER and cargo steamer; 401ft., by 48½ft., by 30ft. 8in.; 4,700 gross tonnage. Built to the order of Messrs. John T. Rennie and Son, Aberdeen, for their service between London, Natal, and East Africa. The *Intaba* is the first vessel built on the Isherwood system of longitudinal framing to have a Board of Trade passenger certificate. The first-class accommodation is on the upper deck amidships and on the bridge deck. The music saloon is on the bridge deck above the dining saloon. The second-class accommodation is on the upper and poop decks. The triple expansion engines have cylinders 27½, 45½ and 75in., by 48in. stroke, and indicate 3,000 H.P. Launched, 6th September.

Wm. Hamilton & Co., Ltd., Port-Glasgow.

"Araujo Pinho." STEEL self-docking pontoon floating dock. Built to the order of South American owners through the agency of Messrs. J. M. Campbell and Son, Glasgow. The dock has a lifting power of 1,300 tons, and is arranged to dock vessels up to 250ft. long. The structure is made up of five separate pontoons, connected by two continuous side walls. The pumping machinery consists of two large horizontal centrifugal pumps by Messrs. Drysdale & Co., Clydebank, placed direct on the main drain and actuated through vertical shafting by steam engines. The pumps are situated in a house on top of one of the walls and take steam from two Cochran donkey boilers. At one end of the dock a bridge is provided, which when closed gives access from one wall to the other, and either part of the bridge can also be used as a crane capable of lifting from the centre-line of the dock weights of six to eight tons. Launched, 11th August.

"Thomas Holt." PASSENGER and cargo steamer; 260½ ft., by 38 ft., by 18½ ft. The vessel was constructed on the Isherwood system of longitudinal framing and classed with Lloyd's Register. Built to the order of Messrs. John Holt & Co. (Liverpool) Limited, for their West African trade. Accommodation for passengers is provided in houses on the shelter deck. A large refrigerating plant with cooling chambers is fitted. The triple expansion engines, by Messrs. David Rowan & Co., Glasgow, have cylinders 18, 30 and 50in., by 33in. stroke, with two boilers. Trial trip, 6th September.

D. & W. Henderson & Co., Ltd., Partick.

"Inventor." PASSENGER and cargo steamer; 470ft., by 58ft., by 34ft. 10in.; about 8,000 gross tonnage. Built for Messrs. Thomas and James Harrison, Liverpool. Comfortable accommodation is provided on the bridge deck for passengers. The quadruple expansion engines, constructed by the shipbuilders, have cylinders 25½, 36½, 52 and 74in., by 54in. stroke, with three boilers. On the trial trip, which took place on 9th September, a mean speed of 14 knots was easily obtained.

A. & J. Inglis, Ltd., Pointhouse.

"Weeroona." PADDLE steamer; 310ft., by 36ft. and 71ft. over the paddles, by 12½ft. Built to the order of the Huddart, Parker & Co. Proprietary, Ltd., Melbourne, Australia, for excursion traffic

inside Port-Philip Heads. The vessel has been designed to carry about 2,200 saloon passengers, and has three complete decks all fore and aft, *viz.*, cabin, main, and promenade, with upper promenade deck amidships and sun roof. Two dining saloons, accommodating about 250 persons, are provided at the fore and after ends of the cabin deck. A lounge room is placed on the main deck aft, with ladies' boudoir adjoining. A tea and coffee restaurant and fruit and bookstall are fitted up at the entrance to the lounge room. A smoking room and barber's shop are also provided. The propelling machinery, constructed by the shipbuilders, consists of three-cylinder compound engines, taking steam from six Navy type boilers. On the trial, which took place on the 14th September, a speed of 18 knots was obtained.

Lobnitz & Co., Renfrew.

SELF-PROPELLING bucket dredger. **"Victoria."** Built for the Leopoldina Railway Co., and designed to dredge to a depth of 14 metres below water level. After completing trials on the Clyde, the vessel will steam to Port Victoria, Brazil. Messrs. Lobnitz have just completed two hopper barges for the same owners, to be used in conjunction with the *Victoria*. Launched, 10th August.

Mackie & Thomson, Limited, Govan.

CARGO steamer, raised quarter-deck type; 200ft., by 30ft., by 14ft. Built for Messrs. Paton and Hendry, Glasgow. The triple expansion engines, placed aft, were constructed by Mr. W. V. V. Lidgerwood, Coatbridge, and the boiler by Messrs. Lindsay, Burnett and Co. Trial trip, 9th September.

Archd. McMillan & Son, Ltd., Dumbarton.

CARGO steamer; 350ft., by 52 $\frac{1}{4}$ ft., by 28 ft. Built for Messrs. Burrell and Son, Glasgow. The propelling machinery was constructed by Messrs. David Rowan and Co., Glasgow. Launched, 1st September.

Murdoch & Murray, Port-Glasgow.

STEAMER, for service on the **"Rio Curuea."** Amazon. Launched, 26th July.

TWIN-SCREW steamer; 150 ft., by 27 $\frac{1}{2}$ ft., by 15 $\frac{3}{4}$ ft. Built to the order of Messrs. John M. Campbell & Son, Glasgow, for

the Empreza Navegacao Bahiana, and designed for river and coast service in South America. The propelling machinery consists of two sets of triple expansion engines. Launched, 23rd August.

"Turuna." PASSENGER and cargo steamer; 230 tons deadweight. Built for service in South America. The propelling machinery was constructed by Messrs. Ross and Duncan, Glasgow. Launched, 30th August.

"Santa Maria." PASSENGER and cargo steamer. Built for service in South America. The propelling machinery was constructed by Messrs. Ross & Duncan, Govan. Launched, 14th September.

Napier & Miller, Ltd., Old Kilpatrick.

TWIN-SCREW passenger and cargo steamer; 265ft., by 37ft., by 26 $\frac{1}{4}$ ft.; about 2,000 gross tonnage. Built to the order of Messrs. Lever Brothers, Ltd., Port-Sunlight, for trading in tropical climates. The vessel has upper, awning, and promenade decks. Accommodation for 36 first-class passengers is provided amidships in staterooms on the upper deck. A large deck house on the awning deck contains the first-class dining saloon, entrance hall, and owners' staterooms, with smoking room above on the promenade deck. A refrigerating installation is fitted, with large cold storage chambers. The two sets of triple expansion engines, by Messrs. J. G. Kincaid & Co., Ltd., Greenock, have cylinders 13 $\frac{1}{2}$, 22 $\frac{1}{2}$ and 37in., by 33in. stroke, with two boilers. Launched, 25th August.

Ramage & Ferguson, Ltd., Leith.

CARGO steamer; 230ft., by 34ft. **"Estrella."** 8in., by 18ft. 7in. Built to the order of the Ellerman Lines, Ltd., Liverpool, for the London and Portuguese trade. The triple expansion engines have cylinders 16 $\frac{1}{2}$, 28 $\frac{1}{2}$ and 48in., by 33in. stroke, with two boilers working at 205lb. pressure under Howden's forced draught. Launched, 22nd September.

Russell & Co., Port-Glasgow.

PASSENGER and cargo steamer; 430 ft., by 56ft., by 29 $\frac{1}{2}$ ft.; 7,400 gross tonnage. Built to the order of Messrs. H. & W. Nelson, Liverpool, for trade between Buenos Ayres and Great Britain. Accommodation is provided for 80 first and 30 second-class passengers. The holds are insulated throughout

for the carriage of frozen meat. The propelling machinery was constructed by Messrs. Rankin and Blackmore, Greenock. Launched, 23rd July.

"Highland Scot." PASSENGER and cargo steamer; 440ft., by 56ft., by 29½ft.; about 8,000 gross tonnage. Built to the order of Messrs. H. and W. Nelson, Liverpool, for trade between Buenos Ayres and Great Britain. Accommodation is provided for 81 first-class, 32 second-class, and about 1,000 steerage passengers. The holds throughout are insulated for the carriage of frozen meat, dairy produce, and other perishable goods, the capacity being about 300,000 cubic feet. On the trials, which took place on the 13th August, a mean speed of 14 knots was obtained on the measured mile.

"Copenhagen." CARGO steamer; 6,700 tons deadweight. Built for Messrs. Glen & Co., Glasgow. The propelling machinery was constructed by Messrs. J. G. Kincaid & Co., Greenock. Trial trip, 19th August.

"Luceric." PASSENGER and cargo steamer, shelter-deck type; 480ft., by 57ft., by 31½ft.; about 7,000 gross tonnage. Built to the order of Messrs. Andrew Weir & Co., London and Glasgow, for the Pacific trade. Accommodation is provided for first-class passengers, and the upper deck is arranged to accommodate a large number of emigrants. The propelling machinery was constructed by Messrs. Rankin & Blackmore, Greenock. Launched, 6th September.

Scott & Sons, Bowling.

"Loch Leven." CARGO steamer; 340 tons. Built for Mr. John G. Stewart, Glasgow. The compound engines were constructed by Messrs. Ross & Duncan, Govan. Launched, 7th September.

Wm. Simons & Co., Limited, Renfrew.

"St. Lawrence." SIMONS patent cutter suction hopper dredger; 2,000 tons hopper capacity. Built for the Director of Works of the British Admiralty. Dredging clay and other hard material by means of a spiral cutter is of recent development, and the *St. Lawrence* is the first dredger of her type constructed in the United Kingdom. An independent set of triple expansion engines for driving the dredging pump is fitted in a separate engine room immediately in front of the hopper compartment. The dredging pump

is of the most massive and powerful description, to withstand the shocks which may be sustained when dredging in clay mixed with stones. The suction pipe is carried on a girder led through a well forward, and is of sufficient length to enable dredging to be done at a depth of 65ft. below the water-line. The dredger is also designed for cutting its own flotation. The cutter at the mouth of the suction pipe is driven through a line of shafting (fitted on the upper side of the suction frame) and machine-cut gearing, actuated by a set of powerful independent compound condensing engines. The hopper is fitted with Simons patent arrangement whereby the contents can be discharged either through the doors in the ordinary way or overside by the pump for land reclamation. In addition to loading into its own hopper, the vessel is arranged to discharge into barges moored alongside or through a pipe-line. Two sets of triple expansion engines are fitted aft for propelling the vessel at a speed of 10 knots. Steam for the propelling and pumping engines and all machinery throughout the dredger is supplied by three marine-type boilers. Launched, 6th September.

Alex. Stephen & Sons, Limited, Linthouse.

"Abhona." TWIN-SCREW passenger steamer; 403 ft., by 50 ft., by 33 ft. The vessel is the first of three under construction by Messrs. Stephen to the order of the British India Steam Navigation Co., Ltd., for their Indian coastal service. There are three complete decks, with bridge and boat decks above, and accommodation is provided for 50 first and 50 second-class passengers. Special provision is made for native passengers, two complete decks being reserved for their use, and it is anticipated that over 3,000 will be carried each voyage during the busy season. The two sets of quadruple expansion engines and two double-ended and four single-ended boilers were constructed by the shipbuilders. Launched, 6th September.

Yarrow & Co., Limited, Scotstoun.

"Sergipe." 27-KNOT torpedo-boat destroyer; 240ft. long, by 23½ft. beam. The vessel is the last of the ten destroyers ordered by the Brazilian Government from Messrs. Yarrow. The two sets of triple expansion four-cylinder engines, of 8,000 H.P. collectively, take steam from two double-ended Yarrow boilers. On the trial, which took place on the 8th July, a speed of 27.676 knots was easily obtained on the measured mile, and 27.605 during a continuous three hours' run, the vessel carrying a load of 100 tons.

TYNE AND BLYTH.

Sir W. G. Armstrong, Whitworth & Co., Ltd.

SCREW tug; 106 $\frac{1}{2}$ ft. long, by 23ft. beam. Built for Messrs. R. Redhead and Son, Newcastle. The propelling machinery, of 750 H.P., was constructed by Messrs. J. P. Rennoldson and Sons, South Shields. Launched at Walker, 4th August.

Blyth Shipbuilding & Dry Docks Co., Ltd.

CARGO steamer, raised quarter-deck type; 255ft. long. Built to the order of Messrs. Sharp and Co., Newcastle, and specially adapted for the coal and timber trades. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 20, 33 and 54in., by 36in. stroke, with two boilers. Trial trip, 9th August.

Jos. T. Eltringham & Co., South Shields.

CARGO steamer; 141ft. long; 250 tons deadweight. Built to the order of Mr. Thomas Rose, Sunderland, for the general coasting trade. Trial trip, 31st August.

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn.

CARGO steamer; 400ft., by 52 $\frac{3}{4}$ ft., by 28 ft. 10 $\frac{1}{2}$ in.; 8,100 tons deadweight. Built for Messrs. William Milburn and Co., London. This vessel is the thirty-fifth ordered by these owners from Messrs. Hawthorn, Leslie and Co. The quadruple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 25 $\frac{1}{2}$, 36, 52 $\frac{1}{2}$ and 76in., by 51in. stroke, with three boilers. Launched, 22nd July.

H.M.S. "Nereide." 27-KNOT ocean-going torpedo-boat destroyer. The vessel is the second of three ordered from these builders under the Naval Programme of 1909-10, and is the twenty-fifth torpedo craft built by them for the British Government. The propelling machinery consists of Parsons turbines, constructed by the shipbuilders at their St. Peter's Works. Launched, 6th September.

"Stephen." PASSENGER and cargo steamer; 355ft., by 50ft., by 26ft.; 6,100 tons deadweight. The vessel is the first of three building at Hebburn to the order

of the Booth Steamship Company, Liverpool, for passenger and cargo trade between Liverpool and the Amazon. Accommodation for 34 first-class passengers, with a dining saloon and smoking room, is situated amidships, and a verandah café is arranged aft. One hundred steerage passengers are accommodated in the shelter 'tween deck aft. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 24, 40 and 67in., by 48in. stroke, with two boilers working under Howden's forced draught. Launched, 20th September.

Northumberland Shipbuilding Co., Ltd., Howdon.

CARGO steamer; 390ft., by 48ft., by 29ft.; 7,500 tons deadweight. Built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., Hull, for their Eastern trade. The 'tween decks are lofty, and so arranged that cattle, troops, or emigrants may be carried if necessary. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Sunderland, have cylinders 25, 41 and 69in., by 48in. stroke, with three boilers. Trial trip, 6th August.

CARGO steamer; 390ft., by 49ft., by 29ft.; 7,450 tons deadweight. Built for the Dalecrest Steamship Co., Ltd. (Messrs. Taylor and Worthington), Liverpool. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Sunderland, have cylinders 25, 41 and 69in., by 48in. stroke, with three boilers. Trial trip, 2nd September.

Palmers Shipbuilding & Iron Co., Ltd., Jarrow.

CARGO steamer; 400 ft. long; 8,400 tons deadweight. Built for the Ellerman Lines, Limited, London and Liverpool. The vessel has complete 'tween decks, with long bridge, poop, and forecastle. The triple expansion engines were constructed by the shipbuilders. Trial trip, 6th September.

John Readhead & Sons, Ltd., South Shields.

CARGO steamer, single-deck type; 333ft., by 48ft., by 23ft. 10in. Built for the Gordon Steam Shipping Co., Ltd., London. The triple expansion engines, constructed by the shipbuilders, have cylinders 23 $\frac{1}{2}$, 39 and 64in., by 42in. stroke, with two boilers. Trial trip, 13th August.

"Loreca." CARGO steamer, single-deck type ; 376ft., by 51ft., by 27ft. 8½in. Built for the English and American Shipping Co., Ltd. (Messrs. C. T. Bowring & Co., Ltd.), London. The triple expansion engines, constructed by the shipbuilders, have cylinders 25½, 42 and 69in., by 48in. stroke, with three boilers. Trial trip, 27th September.

J. P. Rennoldson & Sons, South Shields.

"Abeille No. 5." TWIN-SCREW tug ; 108ft., by 24 ft., by 12 ft. Built for the Remorqueurs les Abeilles, Havre. The propelling machinery consists of two sets of compound engines. Launched, 11th July.

"Abeille No. 6." TWIN-SCREW tug. The vessel is a sister ship to the *Abeille No. 5*, and was built for the same owners. Trial trip, 11th July.

"Irena." COASTING steamer ; 120ft. long. Built for Messrs. Joseph Monks and Co., Liverpool. Launched, 5th September.

Swan, Hunter, & Wigham Richardson, Ltd.

"Franconia." TWIN-SCREW passenger steamer; 625ft. overall, by 72ft. overall ; about 18,000 gross tonnage. Built to the order of the Cunard Steamship Co., Ltd., Liverpool, and primarily intended for their Boston service. In the winter, however, the vessel will be attached to the Cunard fleet cruising between New York and the Mediterranean. Accommodation is provided for 200 first, 500 second, and 1,350 third-class passengers, which, together with a crew of 387, bring the total number of persons carried up to 2,437. There are eight decks in all—the boat, promenade, bridge, shelter, upper, main, lower, and orlop decks. The first-class dining saloon is situated on the bridge deck, and is furnished with two, four, six, and eight-seated tables. A balcony, with a tastefully designed wrought iron balustrading, overlooks the saloon, and above is an elegantly decorated ceiling. A bandstand for an orchestra is situated at the after end of the balcony. Forward on the starboard side of the same deck is the children's dining saloon. The other public rooms are situated on the boat deck. At the after end of the smoking room there is an elliptical retreat, enabling passengers to obtain an uninterrupted view over the stern of the vessel. The verandah café, which adjoins the smoking room, is fitted up with various types of

eighteenth century garden furniture. The lounge immediately adjoins the grand entrance, and the library is also on the boat deck. Almost the whole of the promenade deck is devoted to *en suite* rooms and first-class staterooms, there being four sets of the former, each consisting of a drawing room, bedroom, bathroom, etc. The first-class staterooms accommodate two passengers each, for both of whom lower berths are provided. The second-class accommodation is situated on the bridge and shelter decks. The dining saloon has seating accommodation for 300 persons. The smoking room is a comfortable apartment, and adjoining is a ladies' room. The third-class passenger accommodation is provided on the forward part of the bridge and shelter decks. There are open and covered-in promenades for third-class passengers, and a large dining hall, in addition to other public rooms. The two sets of quadruple expansion engines, by the Wallsend Slipway and Engineering Co., Ltd., have cylinders 33, 47, 67 and 95in., by 60in. stroke, and are balanced on the Yarrow, Schlick and Tweedy system. Launched, 23rd July.

"Carthage." TWIN-SCREW mail and passenger steamer ; 400ft., by 51ft. ; 5,036 gross tonnage. Built to the order of the Cie. Générale Transatlantique, Paris, for service between Marseilles and Algiers. First-class accommodation for 170 passengers is arranged amidships, and includes some *de luxe* rooms. The public rooms comprise dining saloon, lounge, smoking room, etc. Accommodation is also provided for 94 second-class passengers aft and 74 third-class passengers forward. The two sets of four-crank triple expansion engines, balanced on the Yarrow, Schlick and Tweedy system, were constructed by the shipbuilders and take steam from eight boilers fitted with Howden's forced draught. On the trials, which concluded on the 5th August, a speed of 19½ knots was obtained.

"Indrabahar." TWIN-SCREW steamer, shelter-deck type ; 470ft., by 58ft., by 43ft. ; about 7,000 gross tonnage. Built to the order of the Indra Line, Limited (Sir T. B. Royden, Bart., managing owner), Liverpool, for the carriage of refrigerated cargoes from Australia and New Zealand. Three of the holds and the 'tween decks are insulated. Accommodation is provided for about 12 first-class passengers. The two sets of triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, have cylinders 22, 37 and 62in., by 45in. stroke. On the first run from the Tyne to Gravesend the average speed was 14·38 knots. Trial trip, 10th August.

"Bandon." PASSENGER and cattle-carrying steamer; 266ft., by 37ft. beam. Built to the order of the City of Cork Steam Packet Co., Ltd., Cork, for their service between British and Southern Irish ports. Accommodation is provided amidships for about 85 first-class passengers, the dining saloon and smoking room being on the bridge, with staterooms both on the bridge and below. The vessel also has accommodation for a large number of deck passengers. The triple expansion engines, and two boilers working under Howden's forced

of construction—in fact more so than is usual at the time of launching. The boilers were on board, the accommodation for officers and crew practically finished, the navigating arrangements installed, the gun mountings fitted, and boat-lifting and other auxiliary deck machinery in place. The vessel will be ready for steam trials very shortly, the specified sea speed being 27 knots. On the building slip next to that vacated by the *Hope* the keel of another British destroyer has already been laid and the frames erected. This vessel is to be named the *Sandfly*. The

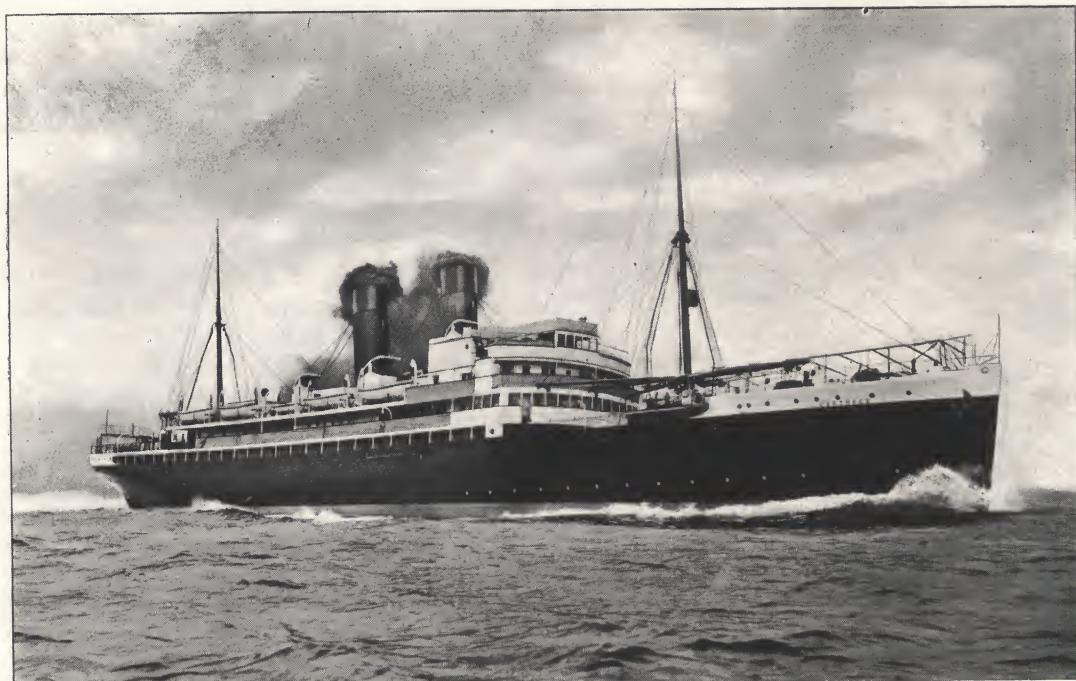


Photo by]

T.S.S. "Carthage."

[Frank & Sons, So. Shields.

draught, were constructed by the shipbuilders, and give a speed of 15 knots. Launched at Walker, 24th August.

H.M.S. "Hope." OCEAN-GOING torpedo-boat destroyer. The vessel is one of the twenty destroyers of the *Acorn* class ordered under the Naval Programme of 1909-10. The main propelling machinery consists of Parsons steam turbines driving three shafts. The steam-generating installation comprises four water-tube boilers of the Yarrow type, fired by oil fuel, and both engines and boilers have been constructed by the Wallsend Slipway and Engineering Co., Ltd. The *Hope* on launching was in an advanced stage

Hope was launched at Wallsend on the 6th September.

Tyne Iron Shipbuilding Co., Ltd., Willington Quay.

"Ingleside." CARGO steamer, single-deck type, constructed on the Isherwood system of longitudinal framing; 360ft., by 50ft., by 25ft. 10in.; 6,400 tons dead-weight. Built for the International Line Steamship Co., Ltd., Whitby. The triple expansion engines, by Messrs. John Dickinson & Sons, Ltd., Sunderland, have cylinders 24, 40 and 66in., by 45in. stroke, with two boilers. The *Ingleside* is the second of three sister ships building at the same shipyard. Trial trip, 8th September.

Wood, Skinner & Co., Limited, Bill Quay.

CARGO steamer, single-deck type.
"Kamma." Built for Mr. Martin Carl, Copenhagen. The triple expansion en-

gines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 17½, 29 and 48in., by 33in. stroke, with one boiler. Trial trip, 31st August.

THE WEAR.**Bartram & Sons, Sunderland.**

CARGO steamer, single-deck type ; 355ft., by 51ft., by 28ft. 2in. ; 7,350 tons dead-weight. Built for Messrs. Gibbs & Co., Cardiff. The triple expansion engines, by Messrs. John Dickinson & Sons, Ltd., Sunderland, have cylinders 25, 42 and 68in., by 48in. stroke, with two boilers. Launched, 25th August.

John Blumer & Co., Sunderland.

CARGO steamer, single-deck type. Built for Messrs. Walter Runciman & Co., Newcastle and London. The propelling machinery was constructed by Messrs. John Dickinson & Sons, Ltd., Sunderland. The *Forestmoor* is the ninth steamer built by Messrs. Blumer for the same owners. Launched, 5th July.

CARGO steamer, single-deck type ; 4,750 tons deadweight. Built for Messrs. Evan Thomas, Radcliffe and Co., Cardiff. The propelling machinery was constructed by Messrs. Blair and Co., Ltd., Stockton. Launched, 3rd September.

John Crown & Sons, Ltd., Sunderland.

CARGO steamer ; 1,500 tons dead-weight. Built to the order of the Newbigin Steam Shipping Co., Ltd., Newcastle, for their coasting and general trade. The propelling machinery was constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Launched, 2nd September.

Wm. Doxford & Sons, Ltd., Sunderland.

CARGO steamer, single-deck type ; 345ft., by 48ft., by 27½ft. ; 6,300 tons dead-weight. Built for Messrs. Edward Nicholl and Co., Cardiff. The triple expansion engines, constructed by the shipbuilders, have cylinders 25, 41 and 66in., by 45in. stroke, with two boilers. Launched, 21st July.

CARGO steamer ; 6,900 tons dead-weight. Built for Messrs. Luco-vich, Banaz and Harris, Ltd.,

London. The tri-compound engines indicate 1,700 H.P. Trial trip, 4th August.

CARGO steamer, single-deck type ; 6,440 tons deadweight. Built for Messrs. Charles Smales and Son, Whitby. The tri-compound engines, constructed by the shipbuilders, indicate 1,450 H.P. Trial trip, 2nd September.

CARGO steamer, single-deck type ; 7,530 tons deadweight. Built for the Fargrove Steam Navigation Co., Ltd. (Messrs. Farrar, Groves & Co.), London. The tri-compound engines, of 2,240 I.H.P., and two boilers were constructed by the shipbuilders. Trial trip, 23rd September.

Sir James Laing & Sons, Ltd., Sunderland.

PASSENGER and cargo steamer ; 370ft., by 44½ft., by 28½ft. ; 5,400 tons deadweight. Built to the order of Messrs. Bullard, King & Co., for their Natal service. Under the long bridge there are staterooms and a dining saloon for 56 first-class passengers, the music room and smoking room being on the bridge deck. Insulated chambers, together with an installation of refrigerating machinery, are fitted. The triple expansion engines have cylinders 27, 44 and 73in., by 48in. stroke, with three boilers. Launched, 7th September.

Osbourne, Graham & Co., Sunderland.

SELF-TRIMMING collier, single-deck type ; 259ft., by 35ft. ; 2,100 tons dead-weight. Built for Mr. Fernand Bouet, Caen. The propelling machinery was constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Launched, 2nd September.

Short Brothers, Limited, Sunderland.

COLLIER ; 291ft., by 40½ft., by 20¾ft. Built for Mr. James West-toll, Sunderland. This vessel is the first collier constructed on the Isherwood system of longitudinal framing. The triple

expansion engines, by Messrs. George Clark, Ltd., Sunderland, have cylinders 20½, 33 and 54in., by 36in. stroke, with two boilers. Launched, 9th August.

"Kendal Castle." CARGO steamer, single-deck type ; 363ft., by 50ft., by 28ft. 1½in. Built

to the order of Messrs. James Chambers and Co., for the Lancashire Shipping Co., Ltd., Liverpool. The triple expansion engines, by Messrs. George Clark, Ltd., Sunderland, have cylinders 25, 41 and 68in., by 45in. stroke, with three boilers working under Howden's forced draught. Trial trip, 22nd August.

"Laristan." CARGO steamer, single-deck type, constructed on the Isherwood system of longitudinal framing ; 360ft., by 50ft. 10in., by 25ft. 8in. ; 6,200 tons deadweight. Built for the Hindustan Steam Shipping Co., Ltd., Newcastle. The triple expansion engines, by Messrs. John Dickinson and Sons, Ltd., Sunderland, have cylinders 24½, 40 and 66in., by 45in. stroke, with two boilers. Launched, 21st September.

Sunderland Shipbuilding Co., Ltd.

CARGO steamer, single-deck type ; 346ft., by 50ft. 10in., by 25½ft. ; 6,350 tons deadweight. Built for London owners. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 24½, 40 and 66in., by 45in. stroke, with two boilers. Launched, 23rd August.

"Signe." CARGO steamer ; 290ft., by 42ft., by 21½ft. ; 3,550 tons deadweight. Built for Mr. M. S. Pedersen, Tonsberg. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 22, 36 and 59in., by 39in. stroke, with two boilers. Trial trip, 3rd September.

"Thisbe." CARGO steamer, raised quarter-deck type ; 223ft., by 33ft., by 16ft. Built for Messrs. G. Lamy and Co., Caen. The triple expansion engines and one boiler were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Launched, 7th September.

Joseph L. Thompson & Sons, Ltd., Sunderland.

CARGO steamer ; 367½ft., by 50ft. 11in., by 27ft. 4in. Built for Messrs. Sivewright, Bacon and Co., Manchester. The triple expansion engines, by Messrs. George Clark, Ltd., Sunderland, have cylinders 25, 41 and 68in., by 48in. stroke, with three boilers. Launched, 21st July.

"Fenay Bridge." CARGO steamer, single-deck type ; 370ft., by 51ft., by 26ft. 4½in. Built for the Fenay Steamship Co., Ltd., London. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, have cylinders 25, 41 and 67in., by 45in. stroke, with two boilers. Launched, 23rd August.

Robt. Thompson & Sons, Ltd., Sunderland.

CARGO steamer, single-deck type ; 361ft. 4in., by 50ft., by 25ft. 10in. Built for the Corbridge Steamship Co., Ltd. (Messrs. James Hoggarth & Co.), Cardiff. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 25, 42 and 68in., by 45in. stroke. Trial trip, 11th August.

"Wedgwood." SELF-TRIMMING collier, raised quarter and well-deck type ; 274½ft., by 38ft., by 18ft. 2in. ; 2,310 tons deadweight. Built for Messrs. William France, Fenwick & Co., Ltd., London and Sunderland. The triple expansion engines and two boilers were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 13th September.

TEES AND HARTLEPOOL.

Craig, Taylor & Co., Ltd., Thornaby.

CARGO steamer ; 7,000 tons deadweight. Built for Messrs. Joseph Hoult & Co., Ltd., Liverpool. The propelling machinery was constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Trial trip, 13th August.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

COLLIER, shelter-deck type, constructed on the builders' cantilever-frame system, with topside water-ballast tanks ; 425ft., by 54ft., by 29ft. ; 8,500 tons deadweight. Built for American owners. The triple expansion engines,

placed aft, were constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, and have cylinders 28, 46 and 77in., by 48in. stroke, with three boilers working under Howden's forced draught. The *Berwindmoor* is believed to be one of the largest merchant colliers yet built. Launched, 6th August.

Wm. Gray & Co., Ltd., West Hartlepool.

CARGO steamer; 342ft., by 46ft., by 24ft. 4in. Built for Messrs. J. E. Murrell & Son, West Hartlepool. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 24, 38 and 64in., by 42in. stroke, with two boilers. Trial trip, 13th September.

Lines, Ltd., for the Liverpool and Lisbon wine trade. The propelling machinery, by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough, will give the vessel a speed of $10\frac{1}{2}$ knots loaded. Launched, 20th September.

Irvine's Shipbldg. & Dry Dock Co., Hartlepool.

PASSENGER and cargo steamer; "Akassa." 375ft., by 50ft., by $25\frac{1}{4}$ ft. The vessel is the eighth built for Messrs. Elder, Dempster & Co., Liverpool, and is intended for the West African trade. Accommodation for 30 first-class passengers, in two-berth staterooms, is arranged under the bridge, with ladies' cabins, etc.; and second-class passengers are accommodated at the after end, under the poop. The dining saloon is on top of

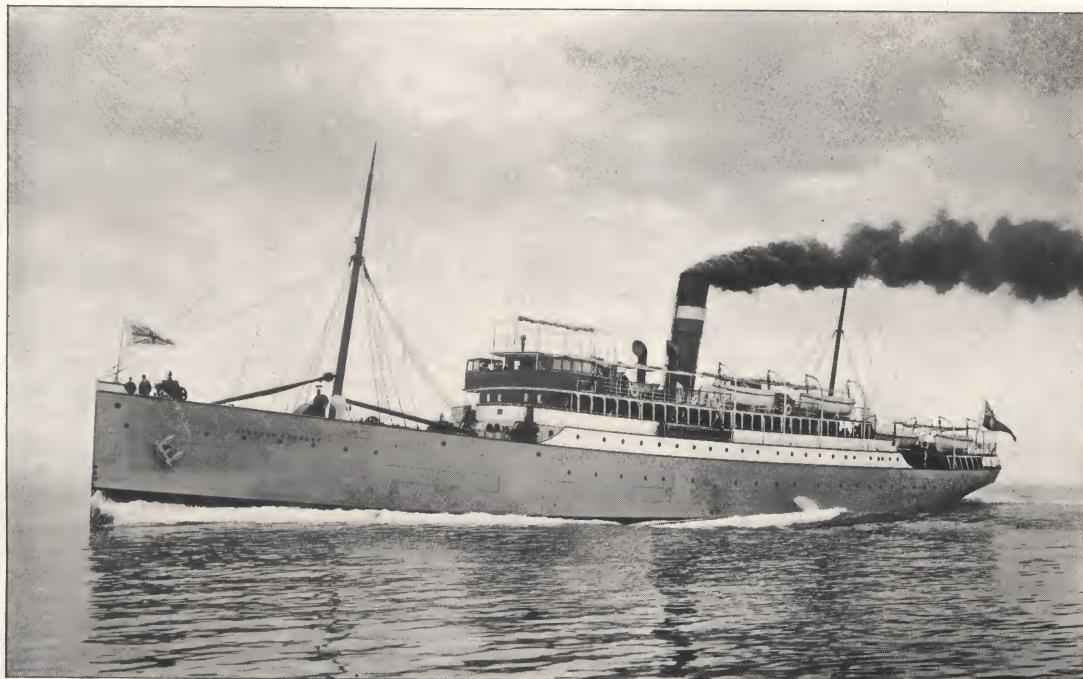


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S.S. "Stephen Furness."

[*Frank & Sons, So. Shields.*

W. Harkess & Son, Ltd., Middlesbrough.

CARGO steamer; 1,025 tons deadweight. Built for Liverpool owners. The propelling machinery was constructed by Messrs. Richardsons, Westgarth and Co., Ltd., Middlesbrough. Launched, 3rd September.

"Norfolk Coast." CARGO steamer; 231 $\frac{1}{2}$ ft., by 35 $\frac{1}{2}$ ft., by 18 $\frac{1}{2}$ ft.; 2,000 tons deadweight. Built to the order of the Ellerman

the bridge, and the smoking room is on the promenade deck above. Under the second-class accommodation aft provision is made for large ice-houses, mail rooms, specie rooms, etc., with a large powder magazine in the 'tween decks amidships. Surf boats, of special design for carrying palm oil through the surf, are provided. The triple expansion engines, by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, have cylinders 25, 40 and 68in., by 48in. stroke, with three main boilers. An installation of the

Contraflo system of condensation and feed-water heating is fitted. On the trial, which took place on the 7th July, a speed of 13 knots was obtained.

"Stephen Furness." PASSENGER and cargo steamer; 305ft. long. Built to the order of

the Tyne-Tees Steam Shipping Co., Ltd., Newcastle, for their Tyne to London trade. The vessel has a complete shelter deck all fore and aft. Accommodation is provided for about 250 first and 120 second-class passengers. The first-class dining saloon is in a large deckhouse on top of the shelter deck at the fore end of the boiler casing. The seating is arranged in bays all round, with small tables to seat not more than four passengers, and the centre tables are of similar size. At the after end of the saloon, the main staircase leads below to the first-class staterooms. The first-class smoking room is situated in a large house at the after end of the engine room, on the same deck level as the dining saloon. A promenade deck is erected overhead, and extends a distance of about 150ft. amidships. A large number of the first-class staterooms are arranged for two passengers, and, in addition, there is a number of special staterooms amidships on the promenade deck. The second-class accommodation is placed under the shelter deck aft, extending from the stern to the engine room bulkhead. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, have cylinders 26, 42 and 72in., by 48in. stroke, with three boilers working under Howden's forced draught. On the trial, which took place on the 12th July, a mean speed of 15 $\frac{3}{4}$ knots was obtained.

"Thistletor." CARGO steamer, single-deck type; 382 $\frac{1}{2}$ ft., by 51ft. 4 $\frac{1}{2}$ in., by 26 $\frac{1}{2}$ ft.; 7,550 tons dead-

weight. Built for the Albyn Line, Ltd. (Messrs. Allan, Black & Co.), Sunderland. The triple expansion engines, by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, have cylinders 25, 40 and 68in., by 48in. stroke, with two boilers. Trial trip, 13th August.

"Lingfield." CARGO steamer, single-deck type; 380ft., by 51ft. 4 $\frac{1}{2}$ in., by 28ft. 4 $\frac{1}{2}$ in.; 7,500 tons deadweight. Built for the Woodfield Steamship Co., Ltd. (Messrs. Woods, Tylor and Brown), London. The triple expansion engines, by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool, have cylinders 26, 42 $\frac{1}{2}$ and 70in., by 48in. stroke, with three boilers. Trial trip, 24th August.

"Driebergen." CARGO steamer; 289 $\frac{1}{2}$ ft., by 40ft. 2in., by 20ft. 6 $\frac{1}{2}$ in. Built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for Mr. J. J. A. van Meel, Rotterdam. The triple expansion engines and two boilers were constructed by Messrs. Richardsons, Westgarth and Co., Ltd., Hartlepool. Launched at the Harbour Dockyard, 5th September.

Ropner & Sons, Ltd., Stockton.

"Artemis." CARGO steamer, fitted with shelter and upper decks; 424ft., by 54ft., by 36ft. 2in.; 9,500 tons deadweight. Built for foreign owners. The vessel has capacity for about 2,100 tons of water ballast in her cellular bottom and peak tanks. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, indicate about 2,000 H.P., taking steam from three boilers. Trial trip, 27th September.

OTHER ENGLISH CENTRES.

Isaac J. Abdela & Mitchell, Ltd., Queensferry, Flints.

"Dory." STEEL lighter; 300 tons capacity, Built for the Rea Transport Company, Liverpool. Launched, 6th August.

— 160-FEET passenger launch, for service on the River Amazon. This is the fourth vessel built for the same service, and another is now on the stocks. Launched, 27th September.

Cammell, Laird & Co., Limited.

"Sarnia." TRIPLE-SCREW turbine passenger steamer; 284ft., by 39ft., by 16 $\frac{1}{2}$ ft. Built to the order of the London

and South Western Railway Co., for their Channel Island traffic. Accommodation is provided for 186 first and 114 second-class passengers, the first-class passengers being accommodated in two-berth staterooms on the promenade and lower decks. The propelling machinery, constructed by the shipbuilders, consists of a set of Parsons turbines and two double-ended boilers, and gives the vessel a speed of 20 knots. Launched at Birkenhead, 9th July.

"Highland Brae." PASSENGER and cargo steamer; 414 ft., by 56ft., by 37ft. 8in. Built to the order of the Nelson Steam Navigation Co., for their River Plate trade. Above the shelter

deck there are saloon, promenade, and boat decks, with accommodation for 81 first and 32 second-class passengers. The vessel will also carry about 3,500 tons of chilled meat. The triple expansion engines were constructed by the ship-builders, and give a sea speed of 13 knots. Launched at Tranmere Bay, 6th August.

TWIN-SCREW ferry steamer ;
"John Joyce." 160ft., by 38½ft., by 11½ft.
 Built to the order of the

Wallasey Urban District Council, and designed to carry about 1,400 passengers. The whole of the machinery is placed under the main deck, thus providing large saloon accommodation. The two sets of triple expansion engines, constructed by the ship-builders, have cylinders 16, 24 and 41in., by 21in. stroke, with two boilers. Trial trip, 1st September.

TRIPLE-SCREW turbine passenger steamer. The vessel is a sister ship to the *Sarnia*, and was built for the same owners. On the trial, which took place on the 14th September, a mean speed of 20½ knots was attained on a course between the Bar and North-West Lightships in Liverpool Bay.

"Snowdrop." TWIN-SCREW ferry steamer. The vessel is a sister ship to the *John Joyce*, and was built for the same owners. Trial trip, 30th September.

Cochrane & Sons, Selby.

SCREW trawler ; 115ft. long.
"Prince Victor." Built for Mr. H. Bernstein, Grimsby. The triple expansion engines were constructed by Messrs. C. D. Holmes & Co., Ltd., Hull. Launched, 7th July.

"H. A. L. Russell" and **"S. L. Haldane."** SCREW trawlers ; 130ft. long. Built for Messrs. Pickering and Haldane's Steam Trawling Co., Ltd., Hull. The triple expansion engines for the *H. A. L. Russell* were constructed by Messrs. Amos and Smith, Ltd., Hull, and those for the *S. L. Haldane* by Messrs. C. D. Holmes and Co., Ltd., Hull. Launched, 25th July.

SCREW tug ; 75ft. long. Built for Mr. J. Constant, London. The triple expansion engines were constructed by Earle's Shipbuilding & Engineering Co., Ltd., Hull. Launched, 8th August.

Eileen Duncan. SCREW trawler ; 120ft. long. Built for Messrs. J. Duncan, Sons & Co., Liverpool. The triple expansion engines were

constructed by Messrs. C. D. Holmes and Co., Ltd., Hull. Launched, 24th August.

SCREW trawler ; 130ft. long. Built for the Crown Steam Fishing Co., Ltd., Grimsby. The triple expansion engines were constructed by Messrs. Amos and Smith, Ltd., Hull. Launched, 7th September.

Day, Summers & Co., Ltd., Southampton.

CARGO and passenger steamer ; 140ft., by 25ft., by 12½ ft. Built for Liebig's Extract of Meat Co., Ltd. Accommodation is provided on the main deck for 12 passengers. The propelling machinery consists of triple expansion engines. Trial trip, 29th July.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

CARGO steamer, single-deck type ; 255ft., by 17ft. 4in. Built to the order of the Wilsons and North Eastern Railway Shipping Co., Ltd., for the Hull and Hamburg trade, and specially adapted for the carriage of fruit and live stock. The triple expansion engines have cylinders 23½, 38 and 62in., by 39in. stroke, with two boilers working under forced draught. On the trial, which took place on the 9th August, a speed of over 15 knots was attained.

"Brittany." PASSENGER and cargo steamer, single-deck type ; 192ft., by 29ft., by 15ft. Built to the order of the London, Brighton, and South Coast Railway Co., for trade between Newhaven and Caen. Accommodation is provided for passengers under the bridge, a large dining saloon and ladies' cabin being situated at the forward end. The main hold is fitted up as an insulated chamber and has a capacity of about 6,500 cubic ft., while the refrigerating plant is capable of cooling 60 tons of butter at least five degrees Fahr. during the voyage of ten hours. The triple expansion engines have cylinders 15½, 25 and 40in., by 27in. stroke, with two boilers. Trial trip, 12th August.

CARGO steamer, single-deck type ; 250ft., by 35ft., by 18ft. Built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., Hull, for their Liverpool and Christiania trade. Launched, 23rd August.

"Como." PASSENGER and cargo steamer, single-deck type ; 265ft., by 36ft., by 18½ft. The vessel is the third of the five ordered from these builders by the Great Central Railway Co., for the quick

service between Grimsby and Hamburg. State-rooms for about 100 first-class passengers are arranged in a commodious house on the bridge deck, with several four-berth cabins on the main deck, and a special luxurious stateroom of large dimensions is also provided on the main deck amidships. Rooms for about 10 second-class passengers are arranged under the poop, and about 300 third-class passengers are berthed in the fore and aft 'tween decks. The first-class ladies' lounge, entrance hall, and smoking room are situated on the bridge deck, while the dining saloons are on the main deck. The triple expansion engines have cylinders 22, 35 and 60in., by 42in. stroke, with two boilers, and indicate about 2,000 H.P. Launched, 8th September.

H. & C. Grayson, Limited, Liverpool.

PASSENGER and towing tenders ;
 "Gopher" 100ft., by 23ft., by 13ft. 1in.
 and
 "Musquash." Built to the order of the Canadian Pacific Railway Co., for service on the Mersey. The triple expansion engines and one boiler were constructed by Messrs. Crabtree and Co., Yarmouth. Launched, 20th September.

John I. Thornycroft & Co., Ltd., Southampton.

27-KNOT ocean-going torpedo-boat destroyer ; 780 tons displacement. The vessel is one of the twenty ordered under the 1909-10 Naval Programme ; and although not the first to take the water, the work was possibly further advanced at date of launching than in the case of the other vessels ordered at the same time, the turbines, boilers, masts, funnels, guns, boats, and other equipment being in position. The *Larne* is fitted with Parsons turbines, and, in common with the other destroyers of her class, will use oil fuel in her water-tube boilers. Launched, 23rd August.

R. Williamson & Son, Workington.

CARGO steamer ; 181ft. 8in., by 28 $\frac{1}{2}$ ft., by 14ft. 7in. ; 1,080 tons deadweight. Built for Norwegian owners. The propelling machinery consists of triple expansion engines and one boiler. Launched, 27th July.

CARGO steamer ; 163 $\frac{3}{4}$ ft., by 26 $\frac{1}{2}$ ft., by 13 ft. 2 in. The propelling machinery consists of triple expansion engines. Launched, 21st September.

THE Thames Ironworks Company expect to have the battleship *Thunderer* ready for launching on the 17th December.

The sudden death of Mr. Charles E. Brown, secretary of the Mercantile Dry Docks Company, Jarrow, took place on the 19th September.

THE fifty-fourth session of the Institution of Engineers and Shipbuilders in Scotland will be opened on the 25th October. The new president (Professor Archibald Barr, B.Sc.) will deliver his presidential address, and a paper on "The Block Coefficient" will be read by Mr. P. A. Hillhouse, B.Sc., of the Fairfield Company, Govan.

ACCORDING to the shipbuilding returns just issued by Lloyd's Register, there were 368 mercantile vessels of a gross tonnage of 1,154,197 under construction in the United Kingdom at the 30th September, 1910. This quantity is about 36,000 tons greater than the new tonnage in hand at the end of the previous quarter (30th June), and also exceeds by 376,000 tons the total building twelve months ago. The mercantile work in hand is divided among the principal shipbuilding districts as follows :—At Belfast, 232,000 tons; Barrow, Maryport, and Workington, 2,979 tons; Glasgow, 259,259 tons;

Greenock, 158,118 tons; Hartlepool and Whitby, 54,048 tons; Liverpool, 32,570 tons; Middlesbrough and Stockton, 65,648 tons; Newcastle, 204,016 tons; and Sunderland, 109,273 tons. During the quarter ending 30th September, 164 mercantile vessels, of 360,343 gross tons, were commenced, and 176 vessels, of 342,339 tons, were launched. As regards naval construction, there were building in the United Kingdom at the 30th September 67 warships, with a total displacement of 312,515 tons, as compared with 66 warships, with a displacement of 378,523 tons, at the 30th June. Of this total, 7 vessels (1 battleship, 2 armoured cruisers, 2 third-class cruisers, and 2 submarines), representing 75,630 tons, were under construction in the Royal Dockyards ; while private shipbuilders had in hand 51 vessels (5 battleships, 3 armoured cruisers, 5 protected cruisers, 33 destroyers, and 5 submarines), representing 226,385 tons, for the British Government, and 9 vessels (2 scouts and 7 destroyers), of 10,500 tons, for foreign governments or "not stated." The returns from foreign and colonial shipbuilding centres received during September show that there were 261 mercantile vessels, of 535,555 gross tons, building out of the British Isles.

Reviews.

Fighting Ships, 1910.—Founded and edited by Fred T. Jane. Price 21/- net. (London: Sampson Low, Marston & Co., Ltd., Overy House, 100, Southwark Street, S.E.)

The new editions of this well-known annual—now in its thirteenth year of issue—are always welcome as carefully compiled and well-illustrated registers of the main characteristics of all the fighting units in the navies of Great Britain, Germany, the United States, Japan, France, Italy, Austria, Russia, and the smaller naval powers. The 1910 edition contains some 500 additional photographs, plans, silhouettes, and special funnel distinctions, so that it can be said with truth that the work is "now within measurable distance of illustrating nearly everything that flies a naval ensign." Particular attention has been bestowed upon the German Navy, which, including ships building, has now reached second place in the world's fleets. "The somewhat theatrical secrecy and reticence observed on naval matters in Germany," says Mr. Jane, "has rendered it very difficult to obtain fully authentic data of new construction"; but nevertheless a good deal has been ascertained, and much of the information given regarding the armour protection of the *Nassaus*, *Von der Tann*, and *Blucher* is new to us. In Part II. of the work, Professor William Hovgaard's article on "The Further Development of the Seagoing Battleship" will be read with particular interest just now, when the question of still larger ships is so much on the *tapis*. We note, for instance, that the present-day hypothetical maximum of 32,000 tons displacement is the Hovgaard minimum. Mr. Jane will forgive us, we feel sure, when we point out two errors in the new edition—the only ones which a fairly close study has revealed. In the section devoted to "Latest British Battleships," it should have been stated that the *Monarch* is building by Sir W. G. Armstrong, Whitworth & Co. and the *Conqueror* by Messrs. William Beardmore & Co., and not *vice versa*. Again, surely the designed speed of these battleships—24 knots—is overstated, since their horse-power is only 27,000.

Other Books received.

"Transactions of the North-East Coast Institution of Engineers and Shipbuilders," Vol. xxvi., 1909-10. "Johow's Hilfsbuch für den Schiffbau" (Johow's Aid to Shipbuilding), Third Edition, Revised by Eduard Krieger; Julius Springer, Berlin; 24/- net. "Submarines of the World's Navies," by Charles W. Domville-Fife; Francis

Griffiths, 34, Maiden Lane, Strand, London, W.C.; 21/- net. "Oil Fields of the Empire," by J. D. Henry; *The Petroleum World*, 32, Great St. Helens, London, E.C.; 18/- post free. "Steamships and Their Story" (with 150 illustrations), by R. A. Fletcher; Sidgwick & Jackson, Ltd., 3, Adam Street, Adelphi, London, W.C.; 16/- net. "The Romance of the Ship: The Story of her Origin and Evolution," by E. Keble Chatterton; Seeley & Co., Ltd., 38, Great Russell Street, London; 5/- net. "Design of Marine Multi-tubular Boilers: A Treatise for Marine Engineers, Marine Draughtsmen, and Students," by James D. McKnight and Alfred W. Brown, A.M.I.Mech.E.; Technical Publishing Co., Ltd., 55 and 56, Chancery Lane, London, W.C.; 3/6 net.

We shall be pleased to supply to readers any of the books referred to above at the prices mentioned, but the cost of postage should be added when the prices named are net. Remittances should be sent to the Publishers of "The Shipbuilder," Newcastle-on-Tyne.

New Catalogues, etc., received.

Messrs. Bassett-Lowke, Ltd., 112, High Holborn, London, W.C., have favoured us with a copy of their model ship catalogue containing particulars and illustrations of model battleships, cruisers, destroyers, liners, sailing and steam yachts, racing motor boats, electric launches, hydroplanes, model propelling machinery, water-tube boilers, propellers, etc.

Messrs. G. W. Clarke & Co. (Liverpool) Ltd., 2B, Central Chambers, 17A, South Castle Street, Liverpool, have sent us an illustrated catalogue of the Barry & Clarke temperature indicator and recorder. This consists of an electrical apparatus, which takes the form of a switchboard, and by the aid of which the temperature of each hold in a ship can be ascertained by placing special thermometers with electrical connections at the points under observation.

Messrs. J. H. Holmes & Co., Portland Road, Newcastle-on-Tyne, have sent us their new illustrated catalogue of "Castle" W type two-pole motors and dynamos fitted with ball bearings.

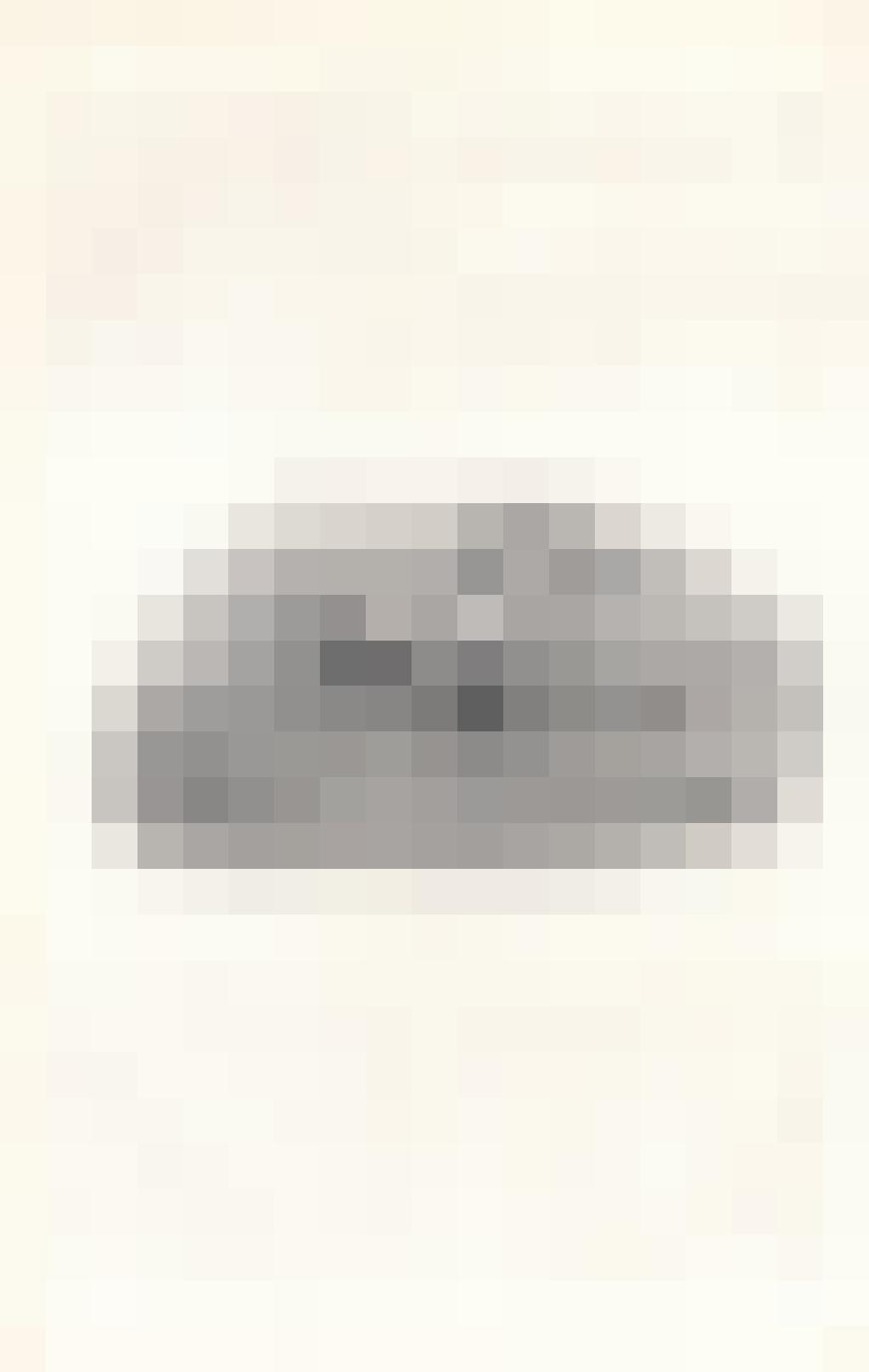
The India-Rubber, Gutta-Percha and Telegraph Works, Co., Ltd., 100-106, Cannon Street, London, E.C., have sent us a copy of their new and beautifully printed booklet describing and illustrating "Silvertown" india-rubber tiling or paving adapted for use aboard ships, yachts, etc.

The Power Plant Co., Ltd., Temple Bar House, Fleet Street, London, E.C., have sent us their illustrated catalogue and price list of armoured india-rubber hose, etc.















of the Transatlantic service. The collection and compilation of the data contained in these sections must have involved much patient research. We confess to being a little disappointed, however, with Mr. Fletcher's treatment of the shipbuilding industry in the sections headed "The Progress of Steamship-building in Great Britain," "Experimental Iron Shipbuilding," "Development of Iron Shipbuilding," and "The Building of Steel Ships." Notwithstanding that no less than four chapters are ostensibly devoted to ship construction, but little is said of the evolution in structural design and character—surely a subject well worthy of popular treatment in the interests of the general as well as the technical reader. Perhaps, however, Messrs. Sidgwick and Jackson will some day issue another volume dedicated to "Shipbuilding and Its Story," which should prove a worthy sequel to "Sailing Ships" and "Steamships." The exhaustive index adds considerably to the value of the volume as a work of reference.

Technische Hydromechanik (Technical Hydro-mechanics). By Dr. Hans Lorenz Price 14/6 net. (Munich: R. Oldenbourg.)

This work forms a thoroughly up-to-date treatise on hydromechanics, and is the most important book on the subject published in German since the now somewhat out-of-date text-book by Rühlmann, issued in 1880. Sections of the new work which will be specially interesting to naval architects are those dealing with the theory of the propeller, ship resistance, and wave motion and the rolling of ships. The book contains about 500 pages of letterpress, helped out by 205 excellent illustrations.

Pocket-Book of Marine Engineering Rules and Tables. Tenth Edition. By A. E. Seaton, M.Inst.C.E., M.I.Mech.E., M.I.N.A., and H. M. Rounthwaite, M.I.Mech.E., M.I.N.A. Price 8/6 net. (London: Charles Griffin & Co., Ltd., Exeter Street, Strand.)

A new edition of this valuable pocket-book having become necessary, the authors have taken the opportunity to thoroughly revise the work. The volume is very compact, and only the most modern and approved practice is discussed, the introduction of extraneous matter of only general interest, which would have made the book unnecessarily bulky, having been avoided. The information and formulæ pertaining to light fast-running machinery in the new edition have been elaborated and based on the most recent practice of the leading engineering firms. The most important alterations and additions, however, will be found in the Rules and Regulations of the Board of Trade, Lloyd's Register of Shipping,

the British Corporation, and the Bureau Veritas; the new regulations of the Board of Trade for motor boats and methods of testing steel castings and forgings, for example, being fully dealt with. Corresponding with the large sizes of ships and machinery now so general, and the increased boiler pressure and decreased condenser pressure so much used in engineering, many of the tables have been extended; and much information has been added in regard to the resistance and propulsion of ships, screw propellers, etc. Exceedingly well arranged, with many diagrams and plates incorporated in the text, and with a copious index to facilitate easy reference, the pocket-book may be recommended as of special value to marine engineers, naval architects, designers, draughtsmen, superintendents, and all engaged in the design and construction of machinery for both war and merchant vessels.

The Design of Condensing Plant: A Practical Treatise. By F. W. Wright. Price 3/6 net. (London: The Technical Publishing Co., Ltd., 55 and 56, Chancery Lane, W.C.)

As is well known, the condensing equipment for steam plants has been engaging the close attention of engineers during the past few years. The increased interest may be largely attributed to the growth and development of the quick-revolution engine and the steam turbine. Doubtless the necessity still exists for much experimental work to solve some of the many complex problems involved, but in the investigations of such men as Stanton, Weighton, Allen, and many others, engineers have before them a sure basis of design. One looks in vain through the majority of text-books on the steam engine, however, for anything like a consistent and thorough treatment of the design and construction of condensing plant, and the formulæ usually given for the proportions of such machinery are very brief. The writer of the book now before us has dealt fully with questions relating to jet, ejector, surface, and evaporative condensers, while water-cooling plant and air-pump efficiencies are also treated. In the appendix is given particulars descriptive of several modern condensing-plant installations carried out in connection with power stations erected in this country.

Other Books received.

Transactions of the Association Technique Maritime, Paris; Vol. xxi., 1910.

Transactions of the Institution of Engineers and Shipbuilders in Scotland, Glasgow; Vol. liii., 1909-10.

"Who's Who, 1911," in cloth 10/- or full limp

leather 12/6 net ; "The Englishwoman's Year-Book and Directory, 1911," 2/6 net ; and "The Writers' and Artists' Year-Book, 1911," 1/- net ; A. & C. Black, Soho Square, London, W.

"The Book of British Ships," by Frank H. Mason, R.B.A., with coloured plates and numerous black and white illustrations by the author ; Henry Frowde and Hodder & Stoughton, 20, Warwick Square, London, E.C. ; 5/-.

"Steam Turbines : Their Design and Construction," by Rankin Kennedy, with 62 illustrations ; Whittaker & Co., 2, White Hart Street, Paternoster Square, London, E.C. ; 4/6 net.

"The Indicator Handbook : a Practical Manual for Engineers," Part I. (Fourth Edition), by Charles N. Pickworth, Wh.Sc., 3/- net ; "The 'Mechanical World' Pocket Diary and Year-Book for 1911," 6d. net ; and "The 'Mechanical World' Electrical Pocket-Book for 1911," 6d. net ; Emmott & Co., Limited, 65, King Street, Manchester.

"The Dynamical Effect of Wave Motion upon Longitudinal Stress in Ships" (published in German), by Dr. Ing. Fritz Horn ; Julius Springer, Monbijouplatz 3, Berlin ; 3/-.

"The Light-keeper," edited by Samuel H. Strain, November, 1910 ; Lighthouse Literature Mission, 21, Linenhall Street, Belfast ; 1/6.

"Ainsley's Nautical Almanac and Tide Tables

for 1911" ; T. L. Ainsley, Mill Dam, South Shields ; 1/-.

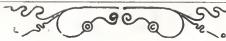
We shall be pleased to supply to readers any of the books referred to above at the prices mentioned, but the cost of postage should be added when the prices named are net. Remittances should be sent to the Publishers of "The Shipbuilder," Newcastle-on-Tyne.

Catalogues, etc., received.

The Electric and Ordnance Accessories Co., Ltd., Aston, Birmingham, have favoured us with a copy of their new catalogue of "Eclipse" electric heaters. The company have introduced three new patterns, unlike any others on the market. Their other patterns are exactly as last season, but owing to the large demand experienced they have been able to make reductions in the price of certain heaters.

Messrs. Frank & Sons, the well-known marine photographers, of South Shields, have sent us a copy of their most artistic calendar for 1911, in which are introduced photographs of the launch of the White Star liner *Olympic* and the French t.s.s. *Carthage*.

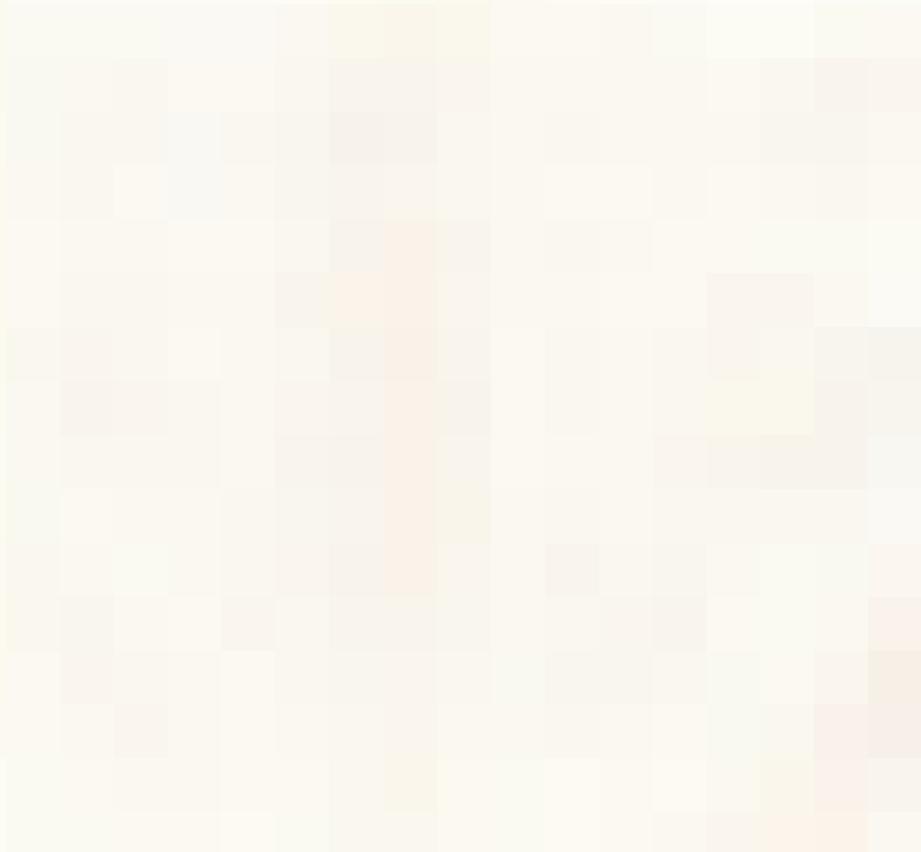
Messrs. Alfred Graham & Co., specialists in loud-speaking naval telephones, of St. Andrew's Works, Crofton Park Road, London, S.E., have sent us a useful combined diary and blotting-pad.



THE annual dinner in connection with the North-East Coast Institution of Engineers and Shipbuilders was held on the 9th December in the Great Hall of the Armstrong College, Newcastle, Colonel R. Saxton White presiding over a large and distinguished company.

ONE hundred years have elapsed since the keel of the pioneer steamship *Comet* was laid down in what is still a shipyard, and now owned by Messrs. Robert Duncan & Co., Port-Glasgow. The vessel was designed by Henry Bell, and built by the brothers John and Charles Wood. She was built of wood, the keel measurement being 40 feet, the breadth 10½ feet, and the measurement 25 tons. She was propelled by paddles, and carried passengers between Dumbarton, Port-Glasgow, Bowling, Greenock, and Helensburgh.

THE directors of Richardsons, Westgarth and Co. have accepted the resignation of the Hon. Marmaduke Furness and Mr. T. Richardson as directors, and the vacancies thus created on the board have been filled by the appointment of Mr. John Esplen, of the firm of John Esplen and Sons, consulting engineers, Liverpool, and Admiral Sir Archibald L. Douglas, G.C.V.O., K.G., C.B. Mr. William Cresswell Gray has resigned his seat on the board of the South Durham Steel and Iron Company, and Mr. G. Mure Richie, chairman of the Millom and Askam Hematite Co., has been appointed in his stead. The board has been further strengthened by the addition of Mr. John E. Rogerson, D.L., J.P., chairman of John Rogerson & Co., Ltd., Wolsingham, Durham.



who build dredgers. The tender of the well-known Renfrew firm was £42,000—much below those of American tenderers.

It is interesting to recall in connection with the above that the first bucket dredger of the hopper type built by Messrs. Simons—who are the originators of the type—was constructed for the Canadian Government so long ago as 1872. It is more interesting still to record that the present year is the centenary of the founding of this well-known dredger-building firm. Although having a record of continuous work as shipbuilders for one hundred years, the locale of operations has not always been the present works at Renfrew. Indeed for a time, at the beginning, the venue was not on the Clyde at all, but on the St. Lawrence, near Montreal, Canada. The firm, however, have occupied their present works at Renfrew for over fifty years, during which they have specialized in the construction of dredging craft of all kinds, producing dredgers and barges of a variety of types for practically every part of the world. Of dredgers alone, during the fifty years' period the firm have constructed upwards of two hundred vessels, ranging in hopper capacity from 150 to 3,000 tons, and having a dredging capacity of from 100 to 12,000 tons per hour. Behind the fifty years of specialized dredger-building, however, there lies a most interesting story of shipbuilding at Greenock, Montreal, Whiteinch, and Renfrew, in which variety, new departures, and notable success are features. The record of work accomplished since the establishment of the business by Mr. Wm. Simons, senior, at Greenock, in 1810, embraces sailing ships, racing yachts, fighting frigates and gunboats for the British Navy, passenger steamers for ocean services, and high-speed river and channel paddle steamers. The full tale of the firm's achievements during the century is interestingly related in a souvenir volume, finely illustrated, which the firm have distributed among their business friends.

During the past quarter, or rather during September, October, November, and the better part of December—throughout which period the lock-out obtained and inactivity characterized the shipyards and engine shops generally—the output of new work was a constantly diminishing figure. In September, as mentioned in our last issue, the launches on the Clyde made an aggregate of 47,000 tons, a higher figure than the monthly average for the year; for October the output was lower than for any preceding month during the year, *viz.*, 21,600 tons; while for November the month's work as represented by launches amounted to no more than 1,730 tons, spread over as many as nine vessels, or an average

of less than 200 tons. The circumstances, therefore, which reduced the output from 47,000 tons in September to 1,730 tons in November, were certainly of a serious character. The resumption of work took place about the middle of December; and although the Christmas and New Year holidays necessarily interfered with operations, the tonnage to the credit of December was over 26,000. With the new contracts which accumulated during the cessation as summarized in the foregoing notes, and with the satisfactory adjustment of the differences as to working arrangements, one may—even at the moment of writing—readily enough succeed in forgetting the time of industrial paralysis.

During the period under review a considerable amount of work already afloat was brought to completion, the most notable items being naval ships. On the 16th December H.M. cruiser *Bristol*, built by Messrs. John Brown and Co., Clydebank, and the first of this class of naval ship propelled by Brown-Curtis turbine engines, ran final engine tests and acceptance trials on the Firth of Clyde. The vessel passed most successfully through her acceptance trials, and left the Tail-of-the-Bank next day for the South of England. The new torpedo-boat destroyer *Cameleon*—launched in June by the Fairfield Shipbuilding and Engineering Co., Govan, and the first to be completed of a new type of destroyer which burns oil fuel only—passed through an exhaustive series of trials on the Clyde in the second half of November, and has since been in the Fairfield Company's tidal basin undergoing her finishing touches before being handed over to the Admiralty. The contract speed was 27 knots, but during a part of the full-power trial she steamed at over 30 knots. Two similar vessels, the *Goldfinch* and *Scorpion*, also from the Fairfield stocks, are at present being prepared for their trials.

As regards merchant ship work completed during the quarter, one vessel of noteworthy character is the steamer *Rotorua*, built by Messrs. Wm. Denny & Bros., Dumbarton, for the New Zealand Shipping Co., and fitted with a combination of reciprocating engines and a low-pressure turbine. Her trials were thoroughly successful, a mean speed of 15.77 knots having been attained on a moderate consumption. She is the second vessel in which the combination of propulsive agents has been fitted for this company, the first vessel being the *Otaki*, built about two years ago.

Shipbuilding operations in the East Coast of Scotland yards—on the Forth, Tay, and Dee—have for the better part of the year been only moderately active, and during the lock-out

period this condition of affairs was greatly accentuated. The number of vessels notwithstanding has been considerable, but the aggregate tonnage small, the vessels on the Dee especially being mostly of the trawler and drifter class. One notable exception to this, referred to at length in our last issue, was the steamer *Intaba*, launched on the 6th September, by Messrs. Hall, Russell & Co., Aberdeen, for the passenger and cargo service between London and Natal of

Messrs. John T. Rennie & Son, Aberdeen. She is the largest vessel ever built at that port, was constructed on the Isherwood longitudinal system, and has triple expansion engines of 3,000 I.H.P., made by the builders. On trial at the end of October, a satisfactory speed was attained with the vessel steaming under sea-going conditions. Unfortunately as regards new work, scarcely anything of note has been reported during the period under review.

BELFAST.

Belfast shipbuilding is in an exceedingly brisk condition, and 1911 is being entered on with a full year's work on hand, both Messrs. Harland and Wolff and Messrs. Workman, Clark & Co. having sufficient orders to keep them going for twelve months without a single contract being booked in the meantime. They were unaffected by the lock-out and have at present an enormous number of men employed. During November and December the wages bill on the Queen's Island was a record one, and but for the lock-out on the other side it is questionable whether Messrs. Harland & Wolff could have got enough hands. They are at present finishing the 45,500-ton liner *Olympic*, which is so far advanced that her boilers and masts have been placed in position. She will leave at the end of May on her trials and will sail from Southampton for New York in June. Her sister ship, the *Titanic*, is on the stocks and will be launched in the early summer. Her plating is completed and already she is partly painted.

During December the Queen's Island firm had three launches, two steamers for the Eastern trade of the Hamburg-Amerika Line, named the *Sachsen* and *Bayern*, and a fine P. & O. liner, of 13,000 tons, named the *Maloja*, which is the biggest vessel in that Line's fleet. The Aberdeen White Star liner *Themistocles*, of 11,500 tons, is also almost ready for sea, so that the firm have at present five vessels afloat of a gross tonnage of 86,500 tons. In addition, they have just completed extensive repairs to the Belgian liner *Albertville*, which is in the Antwerp-Congo trade, and the Anglo-American Oil Company's barge *Navahoe* is in for repairs. This curious craft,

built in 1907, has six masts and is towed across the Atlantic on every voyage. On the stocks, in addition to the *Titanic*, the firm have the *Demosthenes*, an 11,500-ton steamer for the Aberdeen White Star Line, which will be launched early in the New Year, an intermediate steamer for the Union-Castle Line, a passenger steamer for the Belfast Steamship Company's cross-channel service to Liverpool, and a fine steamer for the Royal Mail Steam Packet Co. The latter company have ordered five vessels from Messrs. Harland & Wolff, but two of them will probably be built on the Clyde by Messrs. John Brown and Co., with whom the Queen's Island firm have a working agreement.

Messrs. Workman, Clark & Co. are full up of work. They have quite a fleet of fruit steamers on hand for the United Fruit Co., of Boston, and one for Messrs. Elders & Fyffe's West Indian service. They have two Holt liners on the slips, one of which, named the *Ancheses*, will be launched early in the New Year. They have also a vessel for Messrs. Lampert & Holt and one for a London firm engaged in the Colonial trade, while the finishing touches are being put on to the *Arankola*, a vessel for the British India Steam Navigation Co. On the 21st December the firm delivered to Messrs. Alfred Holt & Co., Liverpool, the s.s. *Ascanius*, the second of the 10,000-ton steamers built for the new passenger service to Australia. During the quarter a new slip has been added to the North Yard.

The new graving dock will be opened in March, and it is likely that the *Olympic* will be the first vessel to enter.

THE TYNE.

During the past three months contracts for a large amount of new mercantile tonnage have been secured by Tyne shipbuilders, including the following:—A large passenger steamer for the

Compagnie Generale Transatlantique, Paris, and a fast passenger vessel of moderate dimensions for the Canadian Pacific Railway Company, by Messrs. Swan, Hunter, & Wigham Richardson;

two steamers of 9,000 tons D.W. for the Swedish Asiatic Company, and two small passenger vessels for the Chirket Hairie, Constantinople, by Messrs. R. & W. Hawthorn, Leslie & Co.; three vessels of about 7,500 tons D.W. for Messrs. Furness, Withy & Co., West Hartlepool, and another of about 7,300 tons D.W. for Messrs. B. J. Sutherland & Co., Newcastle, by the Northumberland Shipbuilding Co.; two large vessels to carry chilled meat between the Argentine Republic and this country for the joint service of Messrs. Furness, Withy & Co. and the Royal Mail Steam Packet Co., by Palmers Shipbuilding & Iron Co.; two cargo steamers of good class for Messrs. Walter Runciman & Co., Newcastle, by Messrs. John Readhead & Sons; a passenger and cargo steamer for the Liverpool, Para, and New York service of the Booth Steamship Co., Liverpool, by the Tyne Iron Shipbuilding Co.; a steamer of about 8,000 tons D.W. for Mr. F. Olsen, Christiania, and a vehicular ferryboat 115ft. long to ply between North and South Shields, by Messrs. Wood, Skinner & Co.; and a screw collier for London owners, by Messrs. William Dobson & Co.

When the intimation was given a few weeks ago that Lord Furness of Grantley had succeeded Sir

Charles McLaren, M.P., as chairman of Palmers Shipbuilding & Iron Company, it was expected to precede developments in connection with their shipbuilding yard and rolling mills of an important and far-reaching character. That these expectations have been partly realised is evident from the announcement, officially made to *The Shipbuilder*, that the company have completed negotiations to take over the Hebburn establishment of Robert Stephenson & Co., comprising the shipyard, graving dock, boiler shop, foundry, etc. Palmers Company entered into formal possession of the Hebburn works on the 1st January; and it is anticipated that shipbuilding operations will be commenced forthwith, the company having several contracts in hand, with the prospect of others coming forward. For the tonnage built at the Hebburn yard the steel material and the propelling machinery will be supplied from the Jarrow works, whose resources and capacity have been greatly increased during recent years. By taking over the Hebburn dock, Palmers Company obtain control of the largest graving dock on the North-East Coast, thus adding still further to their facilities for handling large war and merchant vessels.

THE WEAR.

Wear shipbuilders have booked heavily ahead, and several of them, even without further contracts, will be well employed for the next twelve months. The following are the principal orders secured during the past quarter:—Two cargo and passenger steamers each of 8,000 tons D.W. for Mr. Wilhelm Wilhelmsen's new service between Norway and Sweden and South Africa and Australia, and a cargo steamer of about the same carrying capacity for Mr. F. Olsen, Christiania, by Messrs. William Doxford & Sons; a cargo steamer of about 8,400 tons D.W. for Messrs. Harris & Dixon, London, one for the Bedouin Steam Navigation Co., Liverpool, and another for the Japanese Mitsui Co., by Messrs. Joseph L. Thompson & Sons; a 7,000-ton cargo carrier, and another with a length of 350 feet for Messrs. Thomas Smailes & Son, Whitby, by Messrs. Robert Thompson & Sons; a steamer of 7,000 tons D.W., and another vessel for the Mitsui Co., Japan, by Messrs. John Priestman & Co.; a steamer of considerable tonnage for Messrs. Walter Runciman & Co., Newcastle, by Messrs. John Blumer & Co.; and a vessel for service on the Canadian Great Lakes to the order of Mr. Alfred E. Matthews, of the Matthews Steamship Co., Toronto, by the Sunderland Shipbuilding Co.

Possibly the most interesting vessels at present under construction in the Sunderland shipyards are the 2,200-ton cargo steamer building by Messrs. Osbourne, Graham & Co. on the Ayre-Ballard system of construction, as described in our last issue, and the two high-class vessels which Sir James Laing & Sons have in hand. The first of these two is a twin-screw passenger and emigrant vessel for the National Steam Navigation Co., of Greece, of which Messrs. A. A. Embiricos & Co., London, are the managing owners. She is designed to carry about 200 first and second-class passengers and 1,400 emigrants. Her two sets of quadruple expansion engines, taking steam from five boilers working at 220 lb. pressure under forced draught, are being supplied by Messrs. George Clark, Ltd. The second and somewhat smaller vessel is also for cargo and passenger service, and is being constructed to the order of the Argentine Navigation Company (Nicolas Mihanovich) Ltd., of London. Designed for work in tropical climates, she is of what is generally known as the "three-island type," with long promenade and boat decks, and will carry over 150 first and about 250 third-class passengers.

TEES AND HARTLEPOOL.

The lock-out has ended and work is once more in full swing, with fairly rosy prospects for the future. A good many orders have recently been placed in this district, and enquiries for new tonnage are at present numerous.

At Middlesbrough, Sir Raylton Dixon & Co. have been successful in securing an order for two large self-trimming colliers to carry about 7,600 tons D.W. each, with engines by Messrs. Richardsons, Westgarth & Co. These two vessels are for Messrs. Furness, Withy & Co., and will be run in conjunction with the Dominion Coal Company, Sydney, C.B. The same shipbuilders have also obtained the contract for the repairs to the steamer *Bull*, sunk in the River Tees some time ago, at a figure in the neighbourhood of £5,000. Messrs. Richardsons, Westgarth and Co. have booked a fair amount of marine engineering work for their Middlesbrough works, including the machinery for the 14-knot vessel building by Sir James Laing & Sons to the order of the Argentine Navigation Company, and for three vessels under construction by the Northumberland Shipbuilding Co. on account of Messrs. Furness, Withy & Co. Smith's Dock Company have completed a remarkably good first year's employment on the Tees, both in new work and repairs, their launches during the month of December including two screw trawlers.

At West Hartlepool, the yards have a fair amount of work on the stocks. Irvine's Ship-

building & Dry Docks' Company are to build a large twin-screw steamer about 460 feet long, to carry about 4,000 tons of meat, and to steam 15 knots. This vessel has been ordered by Messrs. Furness, Withy & Co. in conjunction with the Royal Mail Steam Packet Co. Messrs. Richardsons, Westgarth & Co. have recently completed at their Hartlepool works the largest installation of marine evaporators in the world. They are destined for the turbine Atlantic liner *France* building at St. Nazaire, and consist of four units each with a capacity of 200 tons per 24 hours.

At Stockton, only a moderate amount of tonnage is in hand as these notes are being penned, but early in the new year most of the berths should be occupied. A contract for a cargo steamer about 425 feet long, to be built on the Isherwood system of longitudinal framing, has been secured by Messrs. Craig, Taylor & Co. from Messrs. James Chambers & Co., Liverpool. The propelling machinery for this vessel will be supplied by Messrs. Blair & Co. Messrs. Ropner and Sons have received from Messrs. Watts, Watts & Co., London, orders for two 395-feet cargo boats, with engines by Messrs. Blair & Co. It is also understood that Messrs. Ropner have booked several steam barges and that they are about to lay down another vessel on their own account. Messrs. Richardson, Duck & Company's recent bookings comprise two cargo steamers of fair size.

BARROW-IN-FURNESS.

Shipbuilding at Barrow during the past quarter has, industrially speaking, been quiet, owing to the stoppage of a great deal of work by reason of the boilermakers' dispute, now happily at an end. No one, except those in the inner working of shipbuilding establishments, can fully appreciate the disorganization caused by a dispute of this description, and particularly when much of the work in hand is being carried out under guarantees of time delivery; but it is believed that local builders will be able to overtake the delay in the progress of the work, for while the men have been absent the material required to go ahead has been accumulating. There is, however, now found to be a scarcity of workmen, especially in the plating and riveting departments, but this state of affairs should soon be remedied when it is known that there is plenty of employment offering.

Messrs. Vickers, Sons & Maxim are indeed very

busy. During the last quarter they have booked a gigantic battleship-cruiser for Japan, which it is understood will be larger than the *Princess Royal* now building at Barrow for the British Admiralty. Instructions, however, have been given that all information as to the design, type, and general equipment of the vessel is to be kept an inviolate secret. All that is known of the ship is that she will cost approximately two-and-a-half millions of money, and that she will embody all the improvements which the latest scientific and practical experience in warship construction has rendered possible. At all events she will make a marked addition to the work in the hands of the Vickers Company. The shipbuilding stocks are at present occupied by the *Princess Royal*, one of the *Liverpool* type of cruisers, a torpedo-boat destroyer, a Chinese cruiser, a submarine salvage steamer, a floating dock for Aberdeen, and several submarines for the British Navy.

Some disappointment was felt at Barrow, as also on the Tyne, that the order for the new Cunarder went to the Clyde. The Vickers Company have been preparing for some time to enter the list of firms who undertake the building of the largest commercial tonnage, and it is probable that before long they will be entrusted with a commission to build one or more vessels for the great Atlantic lines.

Messrs. Vickers, Sons & Maxim have determined on the provision of a deep-water berth in Walney Channel, where vessels can be fitted up after launching when their width and depth are greater than the docks can accommodate. This berth will also be used for the completion of vessels which have already been partially fitted up in the docks. The scheme will involve the dredging of a berth to a depth of 30ft. at low water, and also the dredging of Walney Channel to the sea, so that the largest vessels when completed can ride safely out of the harbour.

The airship which has been built at Barrow for the British Admiralty is now practically completed. No authentic particulars are available, as here again the Admiralty have determined on absolute secrecy being observed, and with this in view H.M.S. *Hermione* has been at Barrow

for some months guarding the airship. It is expected she will begin her career in the air in the month of January. The Vickers Company have for some time been in the forefront as builders of the heaviest class of warship and the most up-to-date submarines, and now they have to their credit the construction of the first of a fleet of vessels to fly through the air. It is believed that airship-building will prove a new and important industry at Barrow, and it is stated—not officially but nevertheless with some substance of fact behind it—that the Company are already busy in the initial stages of another airship for the Royal Navy. It is also quite on the cards that they will soon undertake the construction of aeroplanes.

The engineering department at the Barrow Works of the Vickers Company is very full of orders, work in hand including the turbine machinery for three of the heaviest ships of war and for three smaller warships, and a big business is also being done in gun mountings for the home and foreign navies. Great activity is promised for a couple of years at least in all the branches of shipbuilding and engineering at Barrow, and it is probable that orders already in hand will be materially increased before long.

THE MERSEY.

In the course of an interesting paper on Ship Model Experiment Tanks delivered before the Liverpool Engineering Society on the 16th November, Professor W. S. Abell pleads for the establishment of such a tank in connection with the Liverpool University. It is now generally recognised that the most satisfactory way at present available for dealing with the problem of the resistance and propulsion of ships is by means of careful tank experiments according to the method devised by the late Mr. Wm. Froude. By model experiments the effect of changes in the shape upon the power required for a proposed vessel can be investigated and the most economical form decided upon. The lack of facilities which at present exists for such experiments in the case of those who have not a tank of their own will soon be largely remedied by the completion of the experimental tank provided by the munificence of Mr. Yarrow at the National Physical Laboratory, but the matter is of such great importance to both shipbuilder and ship-owner that the provision of additional tanks in large shipbuilding centres cannot fail to be of benefit.

The long continuance of the strife between the masters and the boilermakers has severely handicapped progress in the Mersey district, as elsewhere, during the past quarter. With the resumption of work, however, the outlook for the future at the great shipyards of Messrs. Cammell, Laird & Co. and at the other Mersey establishments has never been better. The continually enlarging premises of Cammell, Laird and Co. now cover 100 acres.

The successful trial of the Nelson liner *Highland Brae*, which took place on the 1st November, was marred by a serious accident to Mr. William Boyd, manager of the Tranmere Shipyard, but happily he has now quite recovered and resumed his duties. This vessel left on her maiden voyage to the River Plate on the 21st November, while her two sisters, the *Highland Loch* and *Highland Piper*, as we go to press are nearly ready for launching. H.M. destroyer *Racoona* left for Portsmouth on the 15th October; and the second of the four Amazon steamers, the *Ceara*, is expected to leave for Para before these lines are in print. The *Sarnia*, built for the London & South Western Railway Co., ran a successful trial on the 23rd

Fig. 1.—“Titanic” and “Olympic” on the Stocks.
(Photographed on the day the “Olympic” was launched.)

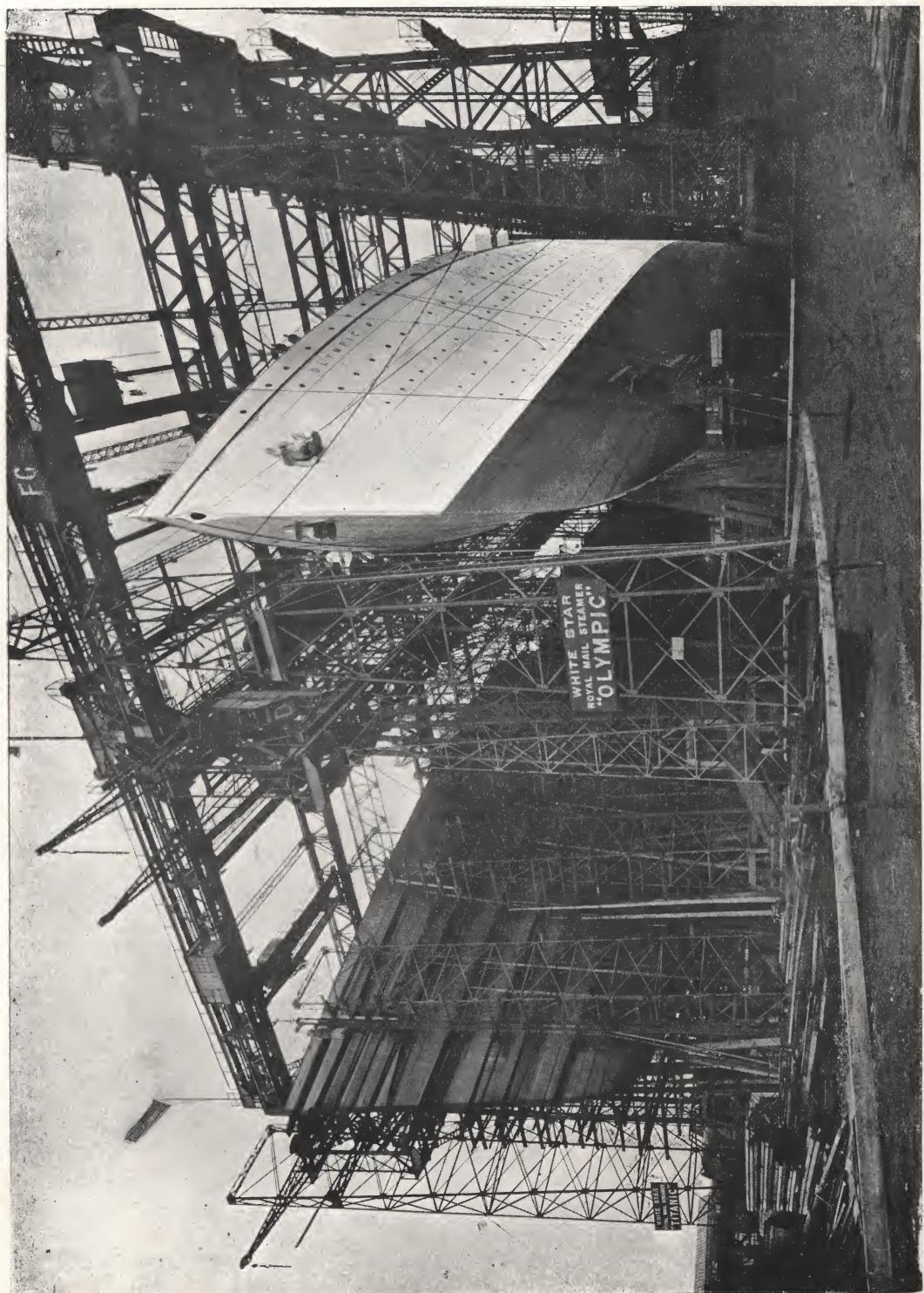




Photo by]

[Frank & Sons, So. Shields.

Fig. 2.—The Stern of the “Olympic,” immediately before Launching.



Photo by]

[Frank & Sons, So. Shields.

Fig. 3.—Fore-foot of "Olympic," showing Make-up of Ways and Forward Cradle.



Fig. 4.—Forward Launching Cradle of "Olympic," showing Hydraulic Jacks and Intensifier.

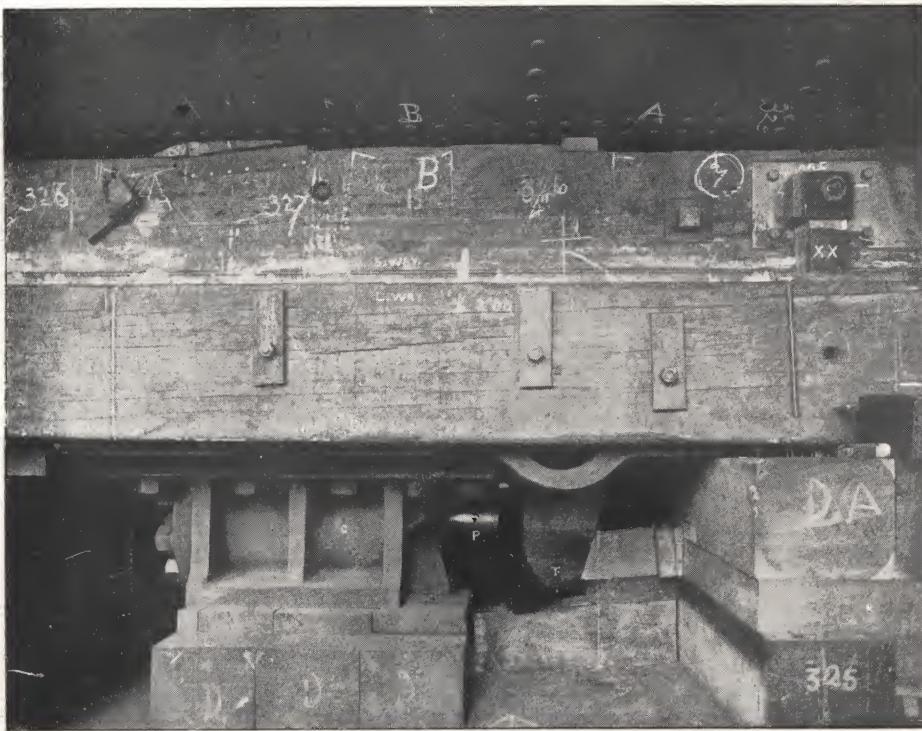


Fig. 5.—Hydraulic Trigger Arrangement incorporated with Standing and Sliding Ways.



Photo by

[Frank & Sons, So. Shields.

Fig. 6.—Pump and Pressure Gauge associated with Launching Trigger.

suggest itself. There was fitted on each of the standing ways at their forward ends a set of four 100-ton hydraulic jacks, which, with the hydraulic intensifier and piping, may be noted in Fig. 4. The rams were fitted close up to heavy thrust-distributing castings against the sliding ways, and each set of four jacks was butted up at their rear end against a cast iron strong-back, which was held in position by rods attached to eight specially designed cast steel anchoring blocks embedded in the concrete foundation at equal intervals down the berth. These tension rods, which are clearly seen in Fig. 3 sloping downwards and backwards from the fore end of the ways, were connected up through a series of yokes to equalise the pressure coming upon them. The jacks could have been worked at a pressure of two tons per sq. inch by means of the intensifiers—seen on the ground at the fore end of the ways in Fig. 4—acting in conjunction with the yard hydraulic mains.

The elaborate arrangement thus generally described did not, as has been stated, require to be brought into requisition. From about the moment of releasing the hydraulic pressure which held the ram and trigger arrangement in action, there was perceptible motion of the sliding ways and their superimposed burden, altogether amounting to 27,000 tons; and thence onwards to the moment when the *Olympic*'s fore-foot dipped from the ways and the vessel became fully waterborne only 62 seconds elapsed. The maximum velocity attained by the stupendous mass in passing down the ways was at the rate of 12½ knots. To the moment when the checking process, as afterwards described, had resulted in changing the *Olympic*'s motion from an outward to an inward one, the whole period did not exceed 1½ minutes; and when brought to rest the bow of the vessel was 500 feet from the end of the ways. The stern dipped to about 34ft. 6in. below the water surface, and the fore-foot on clearing the ways dipped to about 18ft. 9in. Between these two events the very critical part of the launching operation, when the downward thrust of the fore part of the vessel on the poppets and ways was at its maximum, was accomplished with uniform absence of anything like strain, a result which was only to be expected from the impression of solidity and thoroughness conveyed. When the vessel was fully waterborne and at rest the draught was recorded as 20ft. 5in. aft. and 15ft. 8in. forward, these figures, it is stated, corresponding to a displacement of 24,600 tons.

The arrangements for checking the way on the ship when waterborne were thoroughly well devised, and in the event most effective; and it is of interest to state that these represented a departure from the methods hitherto adopted by

the firm in the case of launches from this part of their works. There is here a clear water run of some 2,300 feet, and usually the checking has been done by dropping anchors from the bows when the vessels were afloat. The simplicity of this method, which is the one adopted in not a few shipbuilding districts where launching run is ample, certainly commends itself, and it is a matter for envy on the part of shipyard managers who launch into restricted waters like the upper Clyde, the Tyne, and the Wear, and who have to devise elaborate arrangements of shore drags and check rope attachments. The enormous weight and great length of the *Olympic*, however, suggested, if they did not actually necessitate, some more positive method of checking than had hitherto obtained. Instead of having drag weights on shore in the form of piles of plates or cables, or dropping anchors from the bows when afloat, all the checking influence brought to bear upon the floating *Olympic*—apart, of course, from fluid resistance—was from anchors and masses of cables sunk under water on each side of the launching-run, and connected by wire ropes to eye-plates riveted at suitable intervals to the hull of the vessel along her top-sides. There were three anchors on each side, ranging in weight from 8 to 5½ tons, also a mass of chain cable weighing over 80 tons, all suitably disposed in the bed of the river, and each connected to the attachments on the hull by wire ropes of 7 and 8 in. circumference. The mass of cable was nearest the end of the ways and was the main factor in gradually checking the vessel's progress, the length of check rope in this and the other cases being so arranged as to effect a buffer-like action in retarding the vessel and exert the maximum pull when the vessel had travelled about 100 feet from the standing ways. As a further precaution, the ship's own bow anchors were stowed in the hawse pipes ready for letting go; but this supplementary measure was not requisitioned.

The whole performance, from the moment when the signal to release the vessel was given until she was taken in hand by the tug steamers, was most admirable, and evoked the heartiest enthusiasm from the thousands of spectators inside the yard and congregated at every point of vantage in the neighbourhood. Messrs. Harland & Wolff—although to them the launch of monster ships may by this time be considered almost an ordinary proceeding—deserved and were awarded every congratulation on their latest success. The minuteness and precision with which every detail connected with the operation was carried out showed careful forethought and pre-arrangement, and elaborately prepared and printed

instructions were issued prior to the launch to everyone concerned in it. The critical final operations were carried out under the personal supervision of Lord Pirrie, ably assisted by Mr. Chas. Payne, shipyard manager, and Mr. R. F. Keith, head foreman carpenter, the latter of whom has been responsible for the practical work of launching all the White Star liners as well as many other notable ships.

The water area where required for the launch and berthing of the great vessel had been specially dredged to a depth of about 50 feet, and she was

proceeding very rapidly since the vessel was launched, has been the 200-ton floating crane specially built for the firm by Sir Wm. Arrol and Co., Ltd. This mammoth appliance has been doing notable service in lifting the boilers and machinery into the vessel. All the boilers, refrigerating and electric engines, and the main engines for the most part, have now been placed on board. The work of closing up the decks, casings, etc., which had to be left loose while the machinery was being installed, is now complete. The insulation of provision and cargo chambers

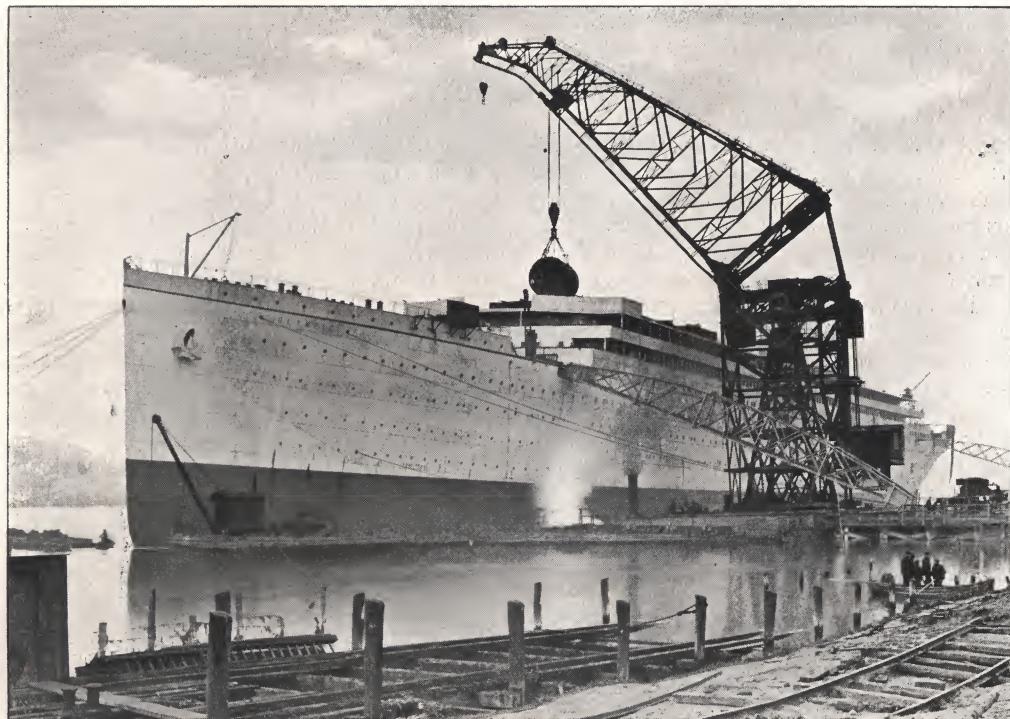
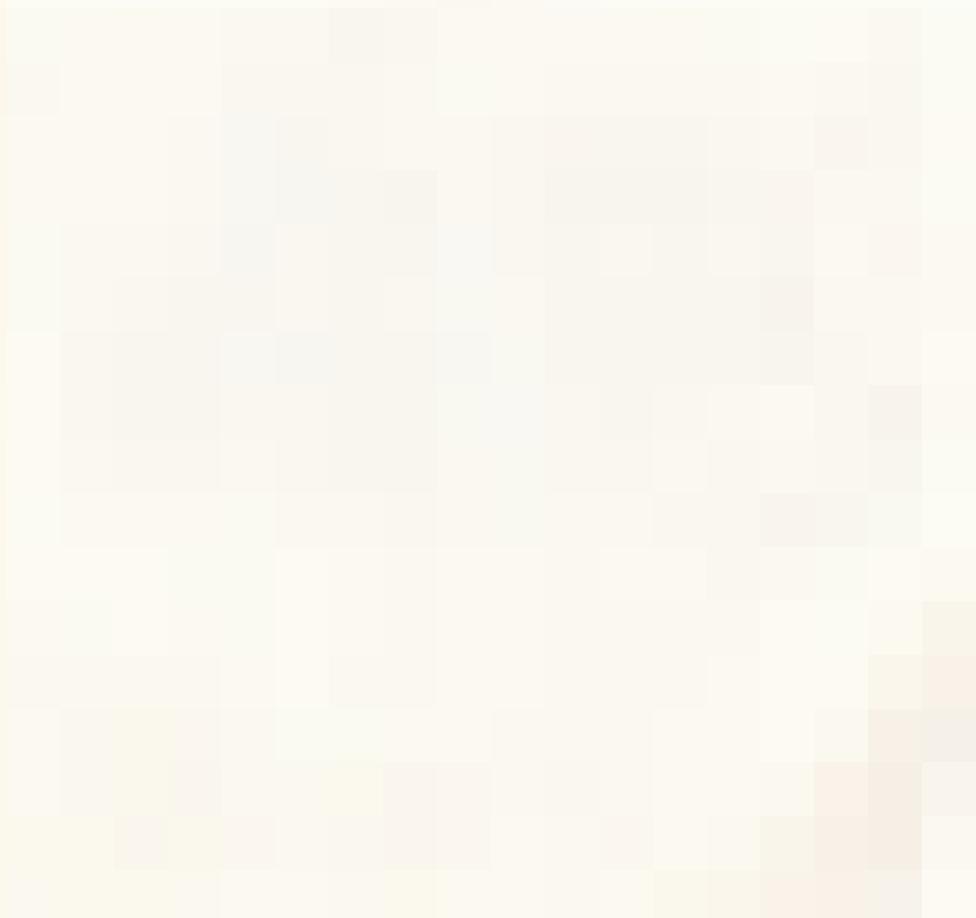


Fig. 7.—Lifting a Boiler on board the "Olympic."

(Photographed 9th November, 1910.)

promptly berthed for outfitting at the new deep wharf belonging to the Belfast Harbour Authorities. Rafts had been specially provided for keeping the ship the required distance from the wharf at the forward and after ends, and strong steel lattice girder gangways had been prepared for communication from the wharf to the ship during the process of fitting out. A highly important factor in this work, which has been

throughout the ship, and the laying and caulking of the upper decks, are being proceeded with. The fitting up of staterooms on all decks and of the side framing and ceiling panelling of the saloons are also items of work now being entered upon. Special electric plant has been arranged for temporary lighting purposes, as many as four thousand 16-c.p. lamps being required to enable the work to be carried on satisfactorily.



caused by the blast. The mountings are of the hydraulic type, the experimental work with electrical fittings on H.M.S. *Invincible* not having yet led to their general adoption.

The *Good Hope* has nearly completed a re-fit which has cost between £70,000 and £80,000. The general impression is that she will go to Australia to replace the *Powerful* as flagship on that station, as the Colonials are said to be dissatisfied with that vessel. The *Good Hope* is one of the best of the pre-*Dreadnought* armoured cruisers.

Besides the *Dreadnought*, the *King Edward VII.* is to undergo an extensive re-fit. The *Britannia's* re-fit has included a long distance "wireless" set.

The most important Yard work during the year has been the great progress made with the super-*Dreadnought* lock and dock, and now a start has been made with the viaduct which is to connect the Dockyard proper with the new large floating dock, due to arrive here in August or September. The floating dock for submarines, which was some time ago placed in Haslar Creek, does not meet requirements, and one of the oldest docks, built originally for the old wooden "three-deckers," is

also being used for the purpose, the vessels being docked two and three abreast. A gantry has been built across the dock for the moving of heavy weights, cells, etc., and new storehouses erected close by. Two of the old docks still have wooden floors.

The new dredger is already at work deepening the site for the new floating dock. It has been built for this purpose to the order of the Admiralty by Messrs. William Simons & Co., of Renfrew, and possesses a special screw-cutting apparatus for removing the stiff blue clay at the bottom of Portsmouth Harbour, enabling it to dredge to a depth of 65 feet. When it has completed its present task, the new dredger will be engaged in deepening the channel on the other side of the harbour where the jetty in connection with the oil fuel dépôt is being constructed, at which warships take in their fuel by pipe lines. Four more huge steel cylinders are here being built ashore and will be completed in two months' time. Each will hold 6,000 tons of oil, and the total capacity of the dépôt will then be raised to 48,000 tons.

DEVONPORT.

Devonport Yard has during the past year concentrated its energies upon the completion of the *Indefatigable*, *Dreadnought*-cruiser, to fly the pennant, and the advancing of the record-breaking cruiser *Lion*, which was launched in August last. The year has been marked by vast improvements in the facilities for dealing with warships, and at Christmas time the Prince of Wales basin alone contained a large fleet, comprising three battleships, six cruisers, and twenty-five destroyers, and yet did not look crowded.

Steady progress is being made with the *Lion*, and the erection of her broadside armour is completed. The water-tube boilers are of the Babcock and Wilcox type, and each weighs approximately 20 tons. There will be seven boiler rooms, the most numerous on any warship, and each of the turbines will weigh no less than 290 tons, the aggregate H.P. being 70,000. The three enormous squat funnels are in position, and the superstructure is assuming bulky proportions, while the four twin barbettes for 13.5-inch guns, the largest and heaviest dealt with at Devonport, are in position. The shafting, however, is not to be fitted until the closing stages of the ship's completion.

The *Indefatigable* did very well indeed on her trials, and in attaining a speed of 27 knots exceeded her designed speed by two knots. This,

however, was achieved when the ship was running at various speeds. On her eight hours' full-power trials in very adverse weather her mean speed was 26 knots, one knot only in excess of her designed speed. In one respect the *Indefatigable* is a disappointment. When launched everyone remarked upon her yacht-like and graceful lines; but now, what with her bulky superstructure, and her three funnels all differing in length, shape, and width, one hears her described as ugliness itself and the most ungainly looking ship in the British Navy.

Some interesting recent comparisons of the cost of Dockyard *v.* contract building have been made. The three contract-built *Invincibles*, of 17,250 tons displacement, have cost £5,258,304 or £1,752,768 each. The *Indefatigable*, in spite of the extra 1,500 tons built into her and her greater length, only cost £1,547,426, or £205,342 less. The result is regarded in Dockyard towns as a great triumph for State workshops, and there is no doubt whatever that Dockyard management has much improved of late years. Labour-saving machinery, especially electrical, has been largely introduced, and there is now very little red tapeism. The tempting baits which private contractors hold out to the higher Dockyard officials is proof positive of their individual ability; and if only private firms could offer the

continuous employment which prevails in State Yards ten would leave where only one official goes now.

The arrival of the destroyer *Cameleon* (Fairfield-built) created a good deal of attention. She is the first of the *Acorn* class to be seen at the Western port, and has quite taken the eye of the sailor-wise. She has somewhat less displacement and general dimensions than the destroyers of the *Viking* and *Beagle* classes; but as she carries the new 21-inch torpedo and an extra 4-inch gun, she and her nineteen sisters are distinctly superior craft. She is oil-driven, and her speed is between the 27 knots of the *Beagle* class and the 33 knots of the *Vikings*.

Considerable alarm was created by the second breakdown of the steering gear of the *Commonwealth*. Such defects rarely occur nowadays

since the forging of the main fittings has been brought to such a pitch of perfection, and consequently attention has been given to all the ships of the *King Edward* class. The *Commonwealth's* defects took two months to make good, a stronger set of fittings being installed.

Among the ships recently overhauled are the cruiser *Highflyer*, the cruiser *Europa*, and the battleship *Hannibal*. The new battleship, for which material has already been assembled, will be started in January. During the year the personnel of the Yard has been maintained at 12,000, with no wholesale discharges, and the prospects for the new year are sound. The oil fuel dépôt has been extended to six million gallons, and reserve petrol storage reservoirs are also to be built.

CHATHAM.

In common with most of the Royal Dockyards, Chatham has during 1910 enjoyed a record run of prosperity. Work has been continuous and in plenty, there have been no discharges or "standing-off" of men, and never has the personnel stood at so high a total. The fear that Chatham was to be relegated into the position of a second-class repairing yard has been entirely falsified; and though the ultimate development of Rosyth may affect Chatham's future, its importance can never be seriously threatened.

The Admiralty has from time to time expressed its appreciation of the expeditious and economical manner in which work has been turned out. This praise not only applies to important re-fits but also to the building of submarines, and it is stated on very good authority that the Dockyard costs have been considerably less than those of similar vessels built by contract. This work is to continue, the competition of the State with the private dockyards being desirable upon public grounds; but the chief new constructional work in the present year will be the building of one of the three unarmoured cruisers, the other two going to Pembroke. The first keel plate was laid early in January.

The chief re-fit of the year just completed is that of the cruiser *Euryalus*, upon which £80,000 has been expended. Other re-fits include work on the battleship *Irresistible* and cruiser *Cressy* (both in hand), and the conversion of the cruiser *St. George* into a dépôt ship for destroyers and the *Intrepid* and *Naiad* into mine-layers.

The Admiralty has decided that the large new

floating dock is to be moored in Salt Pan Reach, a few miles below the Dockyard, at a spot where the Medway Channel is very wide. The dock is to be manned from Chatham, much to the disappointment of Sheerness, which has been hoping for the best for a long time.

It is to the eternal credit of the State that in its Dockyards it not only affords work on what are on the whole model conditions, but that it also gives the best possible technical training to its apprentices. Competition for apprenticeship in the Yard is extremely severe because the boys realise the advantage of not only getting shop training but also studying in the Dockyard schools, little Charlottenburgs, whose achievements far exceed those of any technical college in the country. As Dr. Macnamara, Parliamentary Secretary to the Admiralty, pointed out when addressing the boys at the annual prize-giving, every ship now in active service in the fleet has been designed under the superintendence of directors of naval construction who were ex-Dockyard apprentices. Among the ex-apprentices, he said, are such distinguished men as the late Sir E. J. Reed, chief constructor of the Navy; the late Sir Nathaniel Barnaby, K.C.B., director of naval construction; Mr. James Dunn, assistant to the director of naval construction, afterwards managing director of Vickers, Sons and Maxim, Barrow works; Sir William White, K.C.B., director of naval construction; the late Dr. Elgar, a director of the Dockyards, and chairman of the Fairfield Shipbuilding Company and of Cammell, Laird & Co.; Sir Philip Watts, K.C.B., manager and designer at Elswick, and

director of naval construction ; Mr. J. B. Marshall, C.B., the present director of Dockyards ; Mr. S. J. P. Thearle, chief ship surveyor of Lloyd's Registry ; Mr. W. E. Smith, C.B., present superintendent of the Dockyard Branch ; the three constructive managers at Portsmouth, Devonport, and Chatham ; and very many of the higher Admiralty and Dockyard officials ;

while in the engineering branch there is Engineer-Admiral Sir John Durston, engineer-in-chief of the Navy ; Engineer-Rear-Admiral Rudd, engineer manager at Chatham ; Mr. J. T. Milton, principal engineer surveyor of Lloyd's, etc., etc.

And these are the achievements of boys whose Dockyard schools are in merely hundred-year stores converted into classrooms !

SHEERNESS.

The year 1910 has been one of prosperity for this smaller yard ; for though owing to the increasing size of destroyers the character of the work undertaken has changed, the amount has been well maintained and over 100 more men have been given constant employment. The *Tribal* destroyers now re-fit at Chatham, where the dry docks admit of the withdrawal of their tail shafts ; but as the shorter boats, the ocean-going destroyers, have been transferred here from Chatham, the Yard has not suffered. Sheerness has been called upon to carry out a great deal of repair work arising out of collisions, and t.b.

“072” is now having a new stem and bows built into her. There have been an adequate number of annual re-fits, and during the manœuvres great progress was made with the destroyers *Welland*, *Sprightly*, *Rother*, and *Lively*.

One of the last links with the days of the old “wooden walls” has disappeared with the removal of the old line-of-battle ship *Duncan*, known in later days as the *Pembroke* and *Tenedos II*. For many years she was moored off the port as the flagship of the Commander-in-chief at the Nore. She has been towed up the Thames to be broken up.

PEMBROKE.

The Yard is at present closely engaged on the *Blonde* and the *Active*, the new unarmoured cruisers of the improved *Boadicea* class, which are used to head destroyer flotillas. The *Blanche* has gone through her trials with success, the results obtained having already been published in *The Shipbuilder*.*

The *Blonde*'s superstructure is all in position and the internal work well advanced, and she will be ready for sea in July or August. Like

the *Blanche*, she will carry ten 4-inch guns instead of six, as a reply to similar warship construction by other powers ; but as the extra four guns will be mounted on the broadside abreast of the funnel casings, their sphere of usefulness is limited. The *Blonde* will also carry two torpedo tubes of the improved 21-inch type.

The *Active* is being framed and plated. Re-fits of three destroyers, the *Locust*, *Foyle*, and *Cynthia*, have been put in hand ; but the Yard lacks work of an extensive character, and the year has been one of continuous disappointment.

* Page 94, No. 18, Vol. V.

HAULBOWLINE.

The good news is bruited abroad that bigger vessels are coming to the Irish yard this year for overhaul, the cruiser *Talbot* being mentioned, and this work is sure to be supplemented by another destroyer. The cruiser *Sirius* and the destroyer

Erne are completing their re-fit, and the heavy work of dock extension, which the Admiralty has now taken over from contractors, has been brought well towards a finish.



THE business of the Proprietors of the “Endall” patent morse lamp, the “Speaker” morse lamp, the “Morseaphore,” and the “Morsaphore,” will in future be conducted under the title of the Signalling Specialities Supply Co., at 101, Leadenhall Street, London. The company make all

kinds of signalling lamps, semaphores, etc., and are the patentees of the complete day and night signaller in one fitting. They are now completely equipping many important steamers with their specialities.



and other naval ships for British and foreign governments, as well as other vessels of various types and speeds.

When the large concern of Earle's Shipbuilding and Engineering Co., Hull, was instituted in 1870, under the managing directorship of Sir E. J. Reed, Mr. Shepherd was appointed to the position of shipyard manager. The important work produced here under his control included ironclads for Chili, large warships for H.M. Navy, mail steamers for the North German Lloyd, large yachts for Imperial owners, and merchant and other steamers for nearly every maritime nation.

About 36 years ago, our Headlight was called to the Clyde to take the position of general manager in the shipbuilding works of the old and celebrated firm of Robert Napier and Sons, Govan, and during his *regime* there were built a number of naval ships for the British Admiralty, several liners for the Donald Currie "Castle" fleet, and many other vessels of note. Mr. Shepherd remained with the Napier's until the death of Mr. Robert Napier and the sale of the works, after which he became associated with the Orient Steam Navigation Company, and assisted in the formation of a new mail and passenger service to Australia. As naval architect and surveyor for this company, his first work was the design and construction of the *Orient*, a steamship then generally considered far too large for existing or any likely development of passenger trade, especially as concerned with passage through the Suez Canal. Completed in 1879, however, she soon became a very favourite steamer, and continued so for over thirty years, having indeed only been sold out of service a short time ago. Following the *Orient* came the same company's liner *Austral*, somewhat larger, for whose design Mr. Shepherd was also responsible, and the model of which obtained for him the gold medal of the Shipwrights' Company, London, at their Competitive Exhibition of Ocean Design.

Both the *Orient* and the *Austral* were built at the Fairfield Works, then carried on under the designation of John Elder & Co., and with Mr. (afterwards Sir) William Pearce at the head of affairs. Requiring the services of a naval architect able to relieve him of the practical charge of the shipyard, Mr. Pearce persuaded our Headlight to accept the position. This important post he held for a number of years, during which, as is well known, many of the finest and fastest steamers in the world were produced, including the earliest "greyhounds," a number of fine vessels for the North German Lloyd, and the first vessels of the new fleet of the New Zealand Shipping Co. The most noteworthy productions during Mr. Shepherd's reign, however, were the

Cunard liners *Umbria* and *Etruria*, which with their 500ft. length, 57ft. beam, and 7,718 tons gross, were the leviathans and speed record-breakers of the time.

Variety then characterized the productions of Fairfield even more than to-day, and the work embraced channel steamers for almost all the outlets of this country, high-speed yachts, items of a less conventional character such as the Czar's fantasy, the *Levadia*, and light-draught steamers for pioneering and military service. In connection with vessels of the latter class, Mr. Shepherd has to his credit an achievement in rapidity of construction which, if it has been equalled, has certainly not been surpassed, even in these modern days of record celerity. This was the building of a fleet of stern-wheel steamers for the Nile, suddenly called for to carry the troops up to Khartoum to the relief of General Gordon. The fleet consisted of thirteen vessels, ranging from 80 to 140 feet in length, and these were to be built, tried, and completed in only six weeks from the taking of the order. This involved the construction of the hulls, placing the engines and boilers on board, the trials of several vessels under steam on the Clyde, taking them back to the works, marking and taking them to pieces, and delivery and stowage on board a steamer for shipment to their destination. All this—including, too, the tests of the vessels' armaments—was accomplished in a perfect manner in one day under the time of contract!

It was not, however, fated for Mr. Shepherd to continue on such lines of vigour and enterprise at Fairfield. A disagreement with the principal caused him to throw up his position and leave the company. Soon after this he became the managing director of the London and Glasgow Engineering and Iron Shipbuilding Co., with whom he has since found scope and outlet for that energy which has always distinguished him. In a very short time he had shaken up the company's business from a somewhat lethargic state and brought it into one of great activity, among the orders soon secured being three second-class cruisers from the Admiralty, two large Cunarders, and other liners from his old German friends. The yard ever since has usually been well employed, naval work forming a goodly portion of the business on hand. For the Maritime Coy. of Marseilles and many other well-known lines important vessels have been produced, perhaps the most notable of the later productions being the twin-screw steamer *Osterley*, one of the five almost similar vessels of 12,129 tons and 14,000 I.H.P., having a speed of $17\frac{1}{2}$ knots at sea, built in various yards and added to the Orient fleet in 1909. After repeated endeavours to secure an



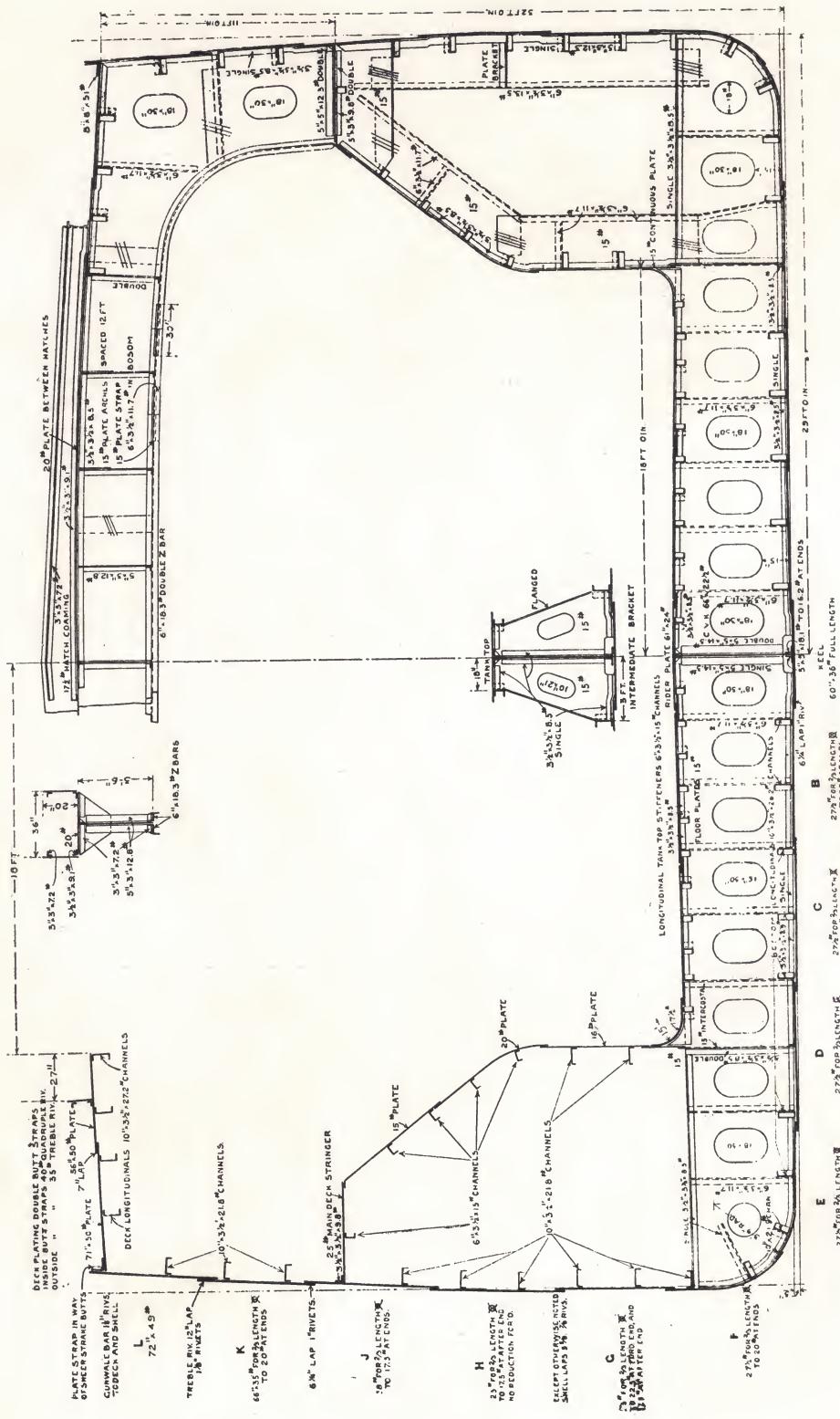


Fig. 3.—Midship Section of *S.S. "William P. Palmer."*

As regards the effect of the block coefficient upon initial stability,

Let KB = height of centre of buoyancy above top of keel,

BM = height of metacentre above centre of buoyancy;

then $KB + BM = MK$ = height of metacentre above top of keel.

Also let b = block coefficient,

B = breadth of vessel,

d = draught of vessel;

then it will be found approximately

$$KB = d \left(0.833 - \frac{b}{1+2b} \right)$$

$$\text{and } BM = \frac{B^2}{d} \left(0.09 - \frac{0.0067}{b} \right)$$

so that

$$\begin{aligned} KM &= d \left(0.833 - \frac{b}{1+2b} \right) + \frac{B^2}{d} \left(0.09 - \frac{0.0067}{b} \right) \\ &= d \left[\left(0.833 - \frac{b}{1+2b} \right) + C^2 \left(0.09 - \frac{0.0067}{b} \right) \right] \end{aligned}$$

where $C = \frac{B}{d}$ = the ratio of beam to draught.

When $C = 3.45$ Mr. Hillhouse states the value of KM is practically uniform for ordinary vessels; for lower values of C , KM diminishes slightly as b increases; for higher values the increase of b is accompanied by a rise in M . In any case, however, the variation in KM , due to change of fulness, is slight, and it may almost be said that on the whole the height of the metacentre is independent of the value of the block coefficient.



The Economy of High Vacuum for Marine Engines.

The evidence given by Mr. Morison in his paper read before the North-East Coast Institution of Engineers and Shipbuilders on the 25th November, and the support he received in the subsequent discussion, seem to prove conclusively that superior economy in the steam consumption of marine engines can be obtained by the use of high vacuum, provided the ports and passages are suitably designed. Experiments with land engines have shown similar results. The late Mr. Willans proved that in his central valve compound engine the consumption of steam per B.H.P. decreased with increased vacuum at the rate of fully 1 per cent. per inch up to 27 inches; and similar results were obtained recently by Professor Mellanby, of the Glasgow and West of Scotland Technical College, in a series of experi-

ments made upon a horizontal cross compound engine in the laboratory of that Institution, and which showed an increase in economy at the rate of practically 1 per cent. per inch increase of vacuum in the condenser from 20 inches to 28 inches vacuum. Another series of observations were communicated to Mr. Morison by Mr. R. K. Morcom, of Messrs. Belliss & Morcom, Ltd., and dealt with a triple expansion high-speed engine of the type manufactured by that firm. In this case the steam consumption of the engine was found to decrease at the rate of about 1.77 per cent. for each increase of 1 inch in the condenser vacuum. As regards marine work, Mr. Morison quotes three representative vessels—the *Indrabarah*, *Anglo-Patagonian*, and *Djerissa*—the engines of which were designed for high vacuum in conjunction with the Contraflo system of condensing and temperature regulation, and from which exceptionally good results have been obtained. Experiments made by Professor Weighton with a new low-pressure cylinder having enlarged ports and passages fitted to the quadruple marine type engine at the Armstrong College point in the same direction. One reason for keeping to the lower vacua in the past has been that a higher temperature of feed water was thereby secured. Mr. Morison shows that the feed water can be heated up to the maximum temperature at which it can be dealt with by the feed pumps by utilizing the exhaust steam from the auxiliaries, so that to ignore the economical possibilities of high vacuum in the engines and work at a low vacuum in the condenser with the sole object of obtaining a high temperature of air pump discharge water has, in his opinion, no object and is wasteful. There is, of course, still the question as to whether the economy secured by the use of Mr. Morison's system justifies the extra first cost involved. This is a matter for the shipowner to decide, and depends upon the cost of fuel and the trade in which the vessel will be engaged. For vessels trading in the tropics there would appear to be no question as to the advantage, Mr. Morison claiming approximately 10 per cent. gain for the "many hundreds of steamships in which the condensers cannot carry more than 20 to 22 inches in the tropics, and in which there is no provision for the utilization of the heat in exhaust steam."



The Armaments of Battleships.

In an important paper on the armaments of battleships contributed to the November meeting of the American Society of Naval Architects and Marine Engineers, Sir Wm. H. White deals mainly with

the controversy which has been waged regarding the merits of the all-big-gun one-calibre battleships of the *Dreadnought* type. As is well known, Sir William has always deprecated the absence of a strong secondary armament in these vessels, and in support of his opinion points out the successful operation of efficient secondary armaments on board the Japanese ships in the Russo-Japanese war, and the assurance he has received from naval officers of great experience that the percentage of hits to rounds fired obtained with 6-in. guns under service conditions at sea compares favourably with, and is not inferior to, the percentages obtained with guns of larger calibre. That there are officers of equal experience who hold the opposite view is evidenced by the policy of the British Admiralty, who, in view of the full information they must possess, would not have dispensed with the 6-in. guns unless persuaded the balance of available facts pointed in that direction. Sir William also does not favour the use of guns of too large a calibre or the mounting of too many big guns in one ship. His personal opinion is summarized in the statement "that in no case is it desirable to carry more than eight heavy guns in a single ship, that these guns are best arranged in four positions as in the *Michigan* class, and that they should be supplemented by a powerful and well-protected secondary armament." The *Michigan* arrangement recommended consists of two turrets placed at each end on the centre-line of the ship, the guns in one turret firing over the top of the other turret. All the guns can be used on each broadside while

four can be used in the "end-on" position, a desirable preponderance being given to broadside fire. With a larger number of turrets, to secure non-interference of the guns, Sir William considers much smaller arcs of command will exist than often shown on paper, unless there is a very considerable increase in the dimensions of ships intended to carry a given number of guns. He does not recommend the system of mounting three guns in one turret and hence exposed to the risk of simultaneous disablement, as in his opinion economy in the weight of protective material and mountings is carried a little too far by such an arrangement. For the secondary armament there are obvious objections to the employment of many calibres, and Sir William would adopt only 6-in. guns. His reason for fixing upon 6-in. guns as a suitable size is that experience has proved the projectiles of about 100 lbs. weight used with this gun to be the maximum which can be man-handled continuously and rapidly. It does not seem a difficult matter to him to supply these 6-in. guns with ammunition which shall be efficient when used against attacking torpedo vessels. With regard to the use of guns of larger calibre instead of 12-in. guns, Sir William White is of opinion that history will repeat itself, and that, as was the case thirty years ago, after experience with the larger guns a return will be made to more moderate calibres, mainly owing to the larger number of rounds which can be fired with the latter, and therefore the greater chance of making a hit.

MESSRS. W. C. Martin and Co., of Glasgow, London, and Newcastle, have installed their system of electrical plant, wiring, and fittings on board a considerable number of passenger and cargo steamers built during the past year. Among other vessels, mention may be made of the Cunard liner *Franconia*, built at Wallsend, which has been equipped with an electric light and power installation comprising about 3,500 lights, in addition to electric bells, clocks, fans, telephones, etc., and over 200 H.P. in electric power for ventilation, heating, culinary, and other appliances. The Royal Holland Lloyd steamer *Zeelandia*, also fitted up by Messrs. Martin, has an installation of some 900 lights, besides ventilating fans, electric radiators, cigar-lighters, bells, telephones, etc. This vessel has been supplied with a system of electric thermometers, which indicate on a dial in the engine room the temperature of the refrigerating chambers. These thermometers can be distributed in the most inaccessible positions, obviating the necessity of

personal inspection and interference with the uniformity of temperature by the opening and closing of doors. Another speciality provided for the *Zeelandia* is an electric rudder indicator, which shows on a dial fixed in the wheel-house the exact position or angle taken up by the rudder. Other vessels electrically equipped by Messrs. Martin during the year include the *Levuka*, *Arankola*, *Abhona*, *Inventor*, *Explorer*, *Royal Scot*, *Bandon*, *Duchess of Richmond*, *Den of Glamis*, *Renvoyle*, etc. ; while the work booked for 1911 comprises installations for the Cunard liner *Laconia*, the Anchor liner *Cameronia* (the twentieth vessel equipped for these owners), the British India Company's *Ellanga* and a sister ship, a passenger vessel for Italian owners, the Clyde Shipping Company's *Ballycotton* and *Warner*, Messrs. Burns, Philp & Company's *Mindini* and another steamer, and the Austro-American liner under construction at Trieste, which will be the largest vessel ever built in Austria.



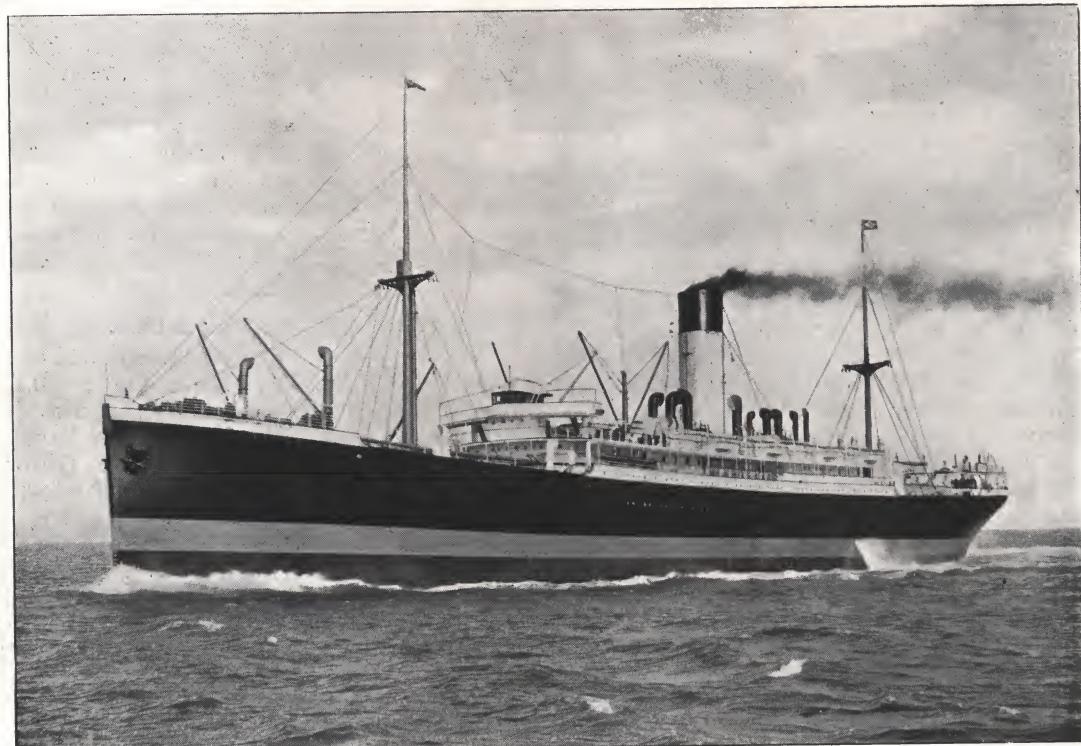
expansion engines, steam being supplied by three double-ended boilers working under an improved system of forced draught. The trials, which took place on the 1st November, were thoroughly satisfactory.

"Arankola." TWIN-SCREW passenger and cargo steamer; 404ft. long; 4,550 gross tonnage. Built for

the British India Steam Navigation Co., Ltd. Accommodation for about 50 first-class passengers is provided on the shade deck, in one, two, and three-berth rooms. A similar number of second-class passengers are also accommodated on this deck. The first-class public rooms include a spacious dining saloon, a social hall,

and a smoking room on the promenade deck. A dining saloon is provided for second-class passengers on the shade deck. The cargo space is divided into three holds. The propelling machinery consists of two sets of quadruple expansion engines, steam being supplied by six boilers working under forced draught. Launched, 2nd November.

"Ascanius." TWIN-SCREW passenger and cargo steamer. The vessel is a sister ship to the *Aeneas*, and was built for the new Australian trade of the Ocean Steamship Company (Messrs. Alfred Holt & Co.), Liverpool. Trial trip, 21st December.



T.S.S. "*Aeneas*."

SCOTLAND.

Bow, M'Lachlan & Co., Ltd., Paisley.

"Princess Mary." TWIN-SCREW passenger steamer; 210 ft., by 40ft., by 16ft. Built for the Canadian Pacific Railway Co. Accommodation is provided for about 200 passengers. The

two sets of triple expansion engines indicate 2,500 H.P., and were constructed by the ship-builders. On the trials, which took place on the 23rd November, a speed of over 15 knots was attained, this being in excess of the contract requirements.

Campbeltown Shipbuilding Co., Campbeltown.

"Bore." CARGO steamer, raised quarter and well-deck type; 2,200 tons dead-weight. Built for the Stockholms Rederiaktiebolag Svea, Stockholm. The triple expansion engines and two boilers were constructed by Messrs. J. G. Kincaid & Co., Greenock. Trial trip, 21st October.

Wm. Denny & Brothers, Dumbarton.

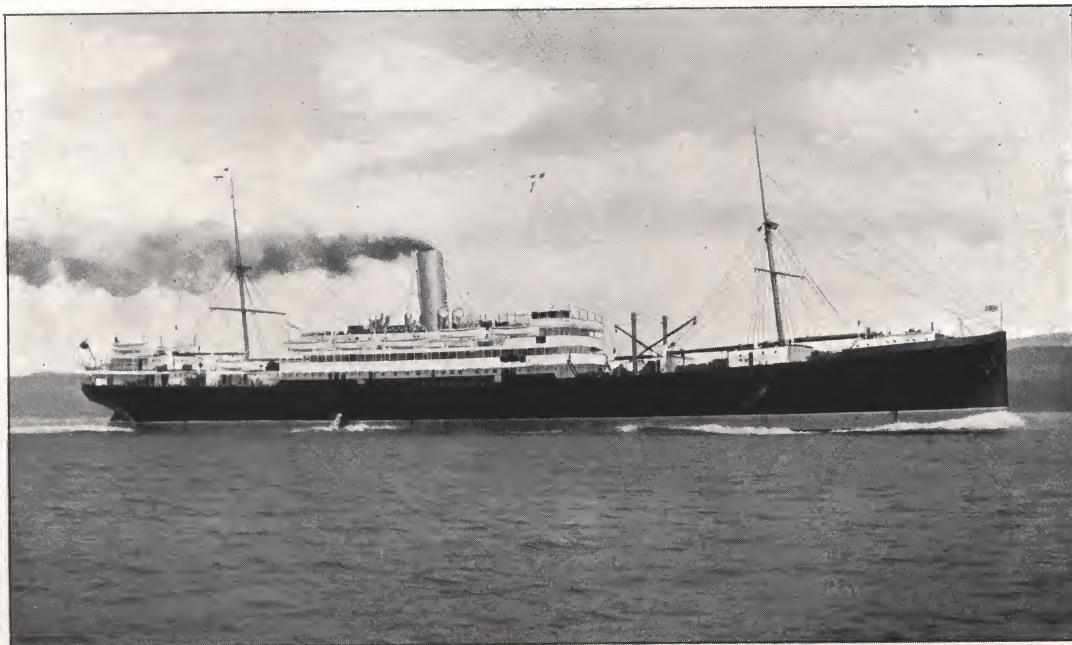
"Angora." TURBINE passenger steamer; 390ft., by 49ft. 11 $\frac{1}{2}$ in., by 32 $\frac{1}{2}$ ft.

Built to the order of the British India Steam Navigation Co., for their mail and passenger service between Calcutta and Rangoon.

holds are provided for carrying 105,000 carcasses of sheep. Like the *Otaki*, constructed by the same builders two years ago, the *Rotorua* is fitted with a combination of reciprocating and turbine engines. The steam is first admitted to each of two triple expansion engines driving twin screws, and then passes to a Parsons low-pressure turbine driving the centre screw. On the trial, which took place on the 5th October, a mean speed of 15.77 knots was attained.

Fairfield Shipbuilding & Eng. Co., Ltd., Govan.

H.M.S. "Cameleon." 27-KNOT ocean-going torpedo-boat destroyer; 920 tons displacement. The



Triple-screw Steamer "Rotorua."

The main deck, which extends from end to end of the vessel, is entirely devoted to accommodation for native passengers. Fifty first and 50 second-class passengers are berthed on the shade deck, and only a moderate amount of cargo is carried. The propelling machinery, constructed by the shipbuilders, will give the vessel a speed of 17 $\frac{1}{2}$ knots. Launched, 1st October.

"Rotorua." TRIPLE-SCREW passenger and cargo steamer; 484ft., by 62ft., by 35ft. Built for the New Zealand Shipping Co., London. Accommodation is provided for 52 first-class, 72 second-class, and 410 third-class passengers. Specially insulated

Cameleon is the first of the twenty destroyers of the 1909-10 programme to be completed. On the full-power trial, which took place on the 29th October, a speed of over 30 knots was attained.

Ferguson Brothers, Port Glasgow.

"Walbrook." TWIN-SCREW tug. The vessel is the last of three built by Messrs. Ferguson Brothers for the Port of London Authority. The two sets of engines develop 1,100 H.P., and take steam from Babcock & Wilcox water-tube boilers. Launched, 3rd October.

Fleming & Ferguson, Ltd., Paisley.

BARGE-LOADING dredger, bucket-ladder type.

T.C.C. No. 8. Built to the order of the Tees Conservancy Commissioners, Middlesbrough, for carrying out improvements on the River Tees. Launched, 1st October.

Wm. Hamilton & Co., Ltd., Port-Glasgow.

CARGO steamer; 413ft., by

"Howick Hall." 51½ft., by 29ft. 7in. Built on the Isherwood system of longitudinal framing to the order of the New York and South America Line (Messrs. C. G. Dunn & Co.), Liverpool. The triple expansion engines, by Messrs. David Rowan & Co., Glasgow, have cylinders 27½, 45 and 75in., by 51in. stroke, with four boilers. Launched, 1st October.

CARGO steamer, single-deck

"Saint Kilda." type; 364ft., by 50ft., by 28ft. 2in.; 6,700 tons deadweight. Built on the Isherwood system of longitudinal framing to the order of Messrs. Rankin, Gilmour & Co., Liverpool. The triple expansion engines, by Messrs. David Rowan and Co., Glasgow, have cylinders 24, 40 and 67in., by 45in. stroke, with three boilers. Launched, 3rd December.

Mackay Brothers, Alloa.

CARGO steamer, raised quarter-

"Perdita." deck type; 182ft., by 26ft., by 12ft. 11¾in. moulded. Built to the order of Messrs. Robert Gilchrist and Co., Liverpool, for their coasting trade. The triple expansion engines and one boiler, placed aft, were constructed by Messrs. MacColl and Pollock, Ltd., Sunderland. Trial trip, 8th December.

Archd. McMillan & Son, Ltd., Dumbarton.

CARGO steamer; 390ft., by

"Strathardle." 52½ft., by 28ft. The vessel is the last of four built for Messrs. Burrell & Son, Glasgow. The propelling machinery was constructed by Messrs. David Rowan and Co., Glasgow. Launched, 24th October.

Murdoch & Murray, Port-Glasgow.

STEAMER, for service on the

"Valparaiso." River Amazon; 400 tons. The propelling machinery was constructed by Messrs. Muir and Houston, Glasgow. Launched, 17th October.

PASSENGER and cargo steamer.

"Aquiry." Built for South American owners. The propelling machinery con-

sists of triple expansion engines. Launched, 5th December.

Napier & Miller, Ltd., Old Kilpatrick.

PASSENGER and cargo steamer;

"Cabral." 174½ft. long; 480 gross tonnage. Built for service on the Amazon to the order of Messrs. James Pollock, Sons and Co., Ltd., London. The vessel has main, promenade, and awning decks, accommodation for 40 first-class passengers being provided amidships, in staterooms on the promenade deck. A cold storage chamber, with a refrigerating plant, is provided. The compound engines and one main boiler and a donkey boiler were constructed by Messrs. Miller & Macfie, Ltd., Glasgow. Launched, 27th October.

A. Rodger & Co., Port-Glasgow.

CARGO steamer, shelter-

"Baron Renfrew." deck type; 275ft., by 40ft., by 29ft.; 3,100 tons deadweight. Built for Messrs. Hugh Hogarth and Co., Glasgow. The propelling machinery was constructed by Messrs. David Rowan and Co., Glasgow. Launched, 17th October.

Russell & Co., Port-Glasgow.

CARGO steamer; 410ft., by

"Drumeraig." 52½ft., by 28½ft.; 5,000 gross tonnage. Built for Messrs. Joseph Chadwick & Son, Liverpool. The triple expansion engines, by Messrs. David Rowan and Co., Glasgow, have cylinders 27, 44 and 73in., by 48in. stroke. Launched, 1st October.

PASSENGER and cargo steamer,

"Orteric." shelter-deck type; 460ft., by 57ft., by 31½ft.; 6,500 gross tonnage. Built to the order of Messrs. Andrew Weir & Co., London and Glasgow, for the Pacific and Australian trade. Accommodation is provided for a number of passengers. The propelling machinery was constructed by Messrs. Rankin and Blackmore, Greenock. Launched, 19th December.

Wm. Simons & Co., Limited, Renfrew.

TWIN-SCREW hopper barge. Built

"Peewit." for the Bombay Port Trustees, to be employed in connection with the improvements now being carried out at that port. The hopper has a capacity of 600 tons. The propelling machinery consists of two sets of compound engines, taking steam from two boilers and giving the vessel a speed of 10 knots.

The *Peewit* is the eighth dredging vessel built by Messrs. Simons for the Bombay Port Trust, and she has been built under the direction of Sir J. Wolfe Barry and Partners. Launched with steam up ready for work, 18th October.

— TWIN-SCREW bow-well barge-loading bucket dredger. Built for the Canadian Government. The dredger is fitted with two sets of compound engines, taking steam from two boilers. Suitable clutches are provided for engaging to and from the propelling and dredging machinery. The dredging wheel gearing is of very strong and massive construction. Each set of engines is arranged to give two speeds of buckets, so that either set of engines is available for driving the dredging gear irrespective of whether the material is of a hard or soft nature, a constant piston speed being

always maintained. The bucket ladder is designed for dredging the vessel's own flotation and to a depth of 50ft. below water-level. The bucket dredging capacity is from 1,000 to 1,200 tons per hour. Steam hoist gear is provided for controlling the bucket ladder. Launched complete and ready for work, 7th November.

Alex. Stephen & Sons, Limited, Linthouse.

TWIN-SCREW passenger and "Elisabethville." cargo steamer; 430ft., by 55ft., by 37ft. Built for Messrs. Elder, Dempster & Co., Ltd., Liverpool. Accommodation is provided for a large number of passengers. The propelling machinery was constructed by the shipbuilders, and will give the vessel a high speed on service with a considerable deadweight on board. Launched, 20th October.

TYNE AND BLYTH.

Sir W. G. Armstrong, Whitworth & Co., Ltd.

CARGO steamer, shelter-deck "Storstad." type; 452ft. long, by 58ft. extreme; 10,650 tons dead-weight. Built on the Isherwood system of longitudinal framing to the order of Messrs. A. F. Klaveness & Co., Sandefjord, for the iron ore trade between Wabana, Newfoundland, and Sydney, C.B. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 28½, 47 and 78in., by 54in. stroke, with three boilers working under Howden's forced draught. Launched at Walker, 4th October.

SECOND-CLASS protected cruiser of the H.M.S. "Weymouth." improved *Bristol* type; 430ft. B.P., by 49ft. beam; 5,500 tons displacement on a normal load draught of 16½ft. Her protective deck, of 2-inch nickel steel, extends the full length of the ship, completely covering all machinery, boilers, magazines, and other vital parts. There is a continuous double bottom, subdivided for the storage of oil fuel. The primary battery is composed of eight 6-inch guns, and the vessel carries two 21-inch torpedo tubes. The Parsons turbine propelling machinery, constructed by the Parsons Marine Steam Turbine Co., Wallsend, drives four shafts, steam being supplied by twelve Yarrow small-tube boilers. The vessel and her machinery have been designed to maintain a speed of 25 knots. The *Weymouth* is the second to take the water of the four similar cruisers ordered by the British Government in October, 1909, the others being the *Falmouth*

(Messrs. William Beardmore & Co.), the *Dartmouth* (Messrs. Vickers, Sons & Maxim), and *Yarmouth* (London & Glasgow Company, Govan). The *Falmouth* was launched on the 20th September last. The keel of the *Weymouth* was laid on the 19th January last, and the vessel was launched at Elswick on the 18th November with her boilers and part of the propelling machinery on board, only the main turbines remaining to be shipped.

OIL tank steamer. Built for the "Esturia." British Burmah Petroleum Co., Ltd., and specially arranged for the carriage of oil in bulk and also in tins. For this purpose the hatches and internal arrangements of the holds are so designed that either cargo can be carried without any structural change of the vessel. She will carry 300,000 tins, in addition to an ample supply of fuel. The vessel is specially subdivided by cofferdams in order that oil of different kinds can be carried in the tanks, and, in addition to this, special arrangements have been made for the carriage of benzine. The pumps and piping are of large capacity. The triple expansion engines give the vessel a speed of 10½ knots fully loaded, and the boilers are arranged to burn liquid fuel, but should occasion require coal can also be used. Trial trip, 26th November.

Blyth Shipbuilding & Dry Docks Co., Ltd.

CARGO steamer, single-deck type; "Syndic." 326ft. long, by 45ft. 10in. beam. Built for Messrs. Isaac B. Pearson and Co., Glasgow. The triple expansion engines

were constructed by the North Eastern Marine Engineering Co., Ltd., Wallsend. Trial trip, 22nd November.

Northumberland Shipbuilding Co., Ltd., Howdon.

CARGO steamer, 'tween-deck type ; "Hova." 390ft. long, by 49ft. beam ; 7,500 tons deadweight. Built for Mr. F. S. Holland. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 25, 41 and 69in., by 48in. stroke, with three boilers. Trial trip, 2nd November.

CARGO steamer ; 371ft., by "Wearbridge." 49ft., by 29ft. 4½in. ; 7,200 tons deadweight. Built for the North of England Steamship Co., Limited (Messrs. Crosby, Magee & Co.), West Hartlepool. The triple expansion engines, by Messrs. Richardson, Westgarth & Co., Ltd., Sunderland, have cylinders 25, 41 and 69in., by 48in. stroke, with three boilers. Launched, 17th November.

THE WEAR.

S. P. Austin & Son, Limited, Sunderland.

COLLIER ; 3,100 tons deadweight. The vessel is the twenty-first built by Messrs. Austin for Messrs. William Cory & Son, Ltd., London. The propelling machinery was constructed by Messrs. George Clark, Ltd., Sunderland. Launched, 1st November.

Wm. Doxford & Sons, Ltd., Sunderland.

CARGO steamer ; 7,000 tons deadweight. Built for the Società Anonima di Navigazione a Vapore "Lussiano," Lussinpiccolo. The triple expansion engines and boilers were constructed by the shipbuilders. Launched, 15th December.

Short Brothers, Limited, Sunderland.

CARGO steamer ; 389ft., by "Anticosti." 52ft., by 30½ft. Built on the Isherwood system of longitudinal framing to the order of Messrs. E. F. and W. Roberts, Liverpool, for the carriage of coal under charter to the Dominion Coal and Iron Co., Sydney, C.B. The cargo and bunkers are entirely self-trimming ; and water ballast, amounting in all to 2,500 tons, is carried throughout the double bottom, in the fore and after

CARGO steamer, shelter-deck type, with three complete steel decks ; 425ft. long ; 9,000 tons deadweight. Built to the order of Messrs. Thomas Wilson, Sons & Co., Hull, for their Atlantic trade. The shelter 'tween deck is of exceptional height, and is arranged so that a large number of emigrants can be carried. The triple expansion engines indicate about 3,000 H.P., and were constructed by Earle's Shipbuilding and Engineering Co., Ltd., Hull. Trial trip, 9th December.

Wood, Skinner & Co., Limited, Bill Quay.

CARGO steamer, long raised quarter-deck type. Built for "Marsden." the Burnett Steamship Co., Ltd., Newcastle. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 21½, 35 and 58in., by 39in. stroke, with two boilers. Trial trip, 17th October.

peaks, and in wing tanks the full length of the holds and engine space. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 26, 44 and 73in., by 48in. stroke, with three boilers working under Howden's forced draught. Launched, 17th November.

Sunderland Shipbuilding Co., Ltd.

CARGO steamer ; 346ft. 5in., by "Anerley." 50ft. 10in., by 25½ft. ; 6,350 tons deadweight. Built for "Una" Limited (Messrs. Houlder, Middleton & Co., Ltd.), London. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 24½, 40 and 66in., by 45in. stroke, with two boilers. Trial trip, 2nd November.

Robt. Thompson & Sons, Ltd., Sunderland.

SELF-TRIMMING collier, raised "Kirkwood." quarter and well-deck type ; 274½ft., by 38ft., by 18ft. 2in. ; 2,310 tons deadweight. Built for Messrs. William France, Fenwick & Co., Ltd., London and Sunderland. The triple expansion engines and two boilers were constructed by the North Eastern Marine Engineering Co., Ltd., Sunderland. Launched, 30th November.

TEES AND HARTLEPOOL.

Craig, Taylor & Co., Ltd., Thornaby.

CARGO steamer, single-deck type; 392ft., by 52ft., by 29½ft. Built for the Clapham Steamship Co., Ltd. (Messrs. Henry Clapham & Co.), Newcastle. The triple expansion engines, by Messrs. MacColl and Pollock, Ltd., Sunderland, have cylinders 25½, 43 and 70in., by 45in. stroke, with three boilers. Launched, 16th December.

Sir Raylton Dixon & Co., Ltd., Middlesbrough.

COLLIER, shelter-deck type, "Berwindvale." constructed on the builders' cantilever-frame system, with topside water-ballast tanks; 425ft., by 54ft., by 29ft.; 8,500 tons deadweight. Built for American owners. The triple expansion engines, placed aft, were constructed by Messrs. Richardson, Westgarth & Co., Ltd., Hartlepool, and have cylinders 28, 46 and 77in., by 48in. stroke, with three boilers working under Howden's forced draught. The *Berwindvale* is believed to be one of the largest merchant colliers yet built. Launched, 15th December.

Wm. Gray & Co., Ltd., West Hartlepool.

CARGO steamer; 441ft., by "Harpalion." 53½ft., by 31ft. 8in. Built for Messrs. J. & C. Harrison, Ltd., London. The triple expansion engines, constructed at the Central Marine Engine Works of

the shipbuilders, have cylinders 28, 45 and 75in., by 51in. stroke, with four boilers working under Howden's forced draught. Launched, 4th October.

CARGO steamer, shelter-deck type; "Escrick." 395ft., by 53½ft., by 25ft. 5in. Built for the London and Northern Steamship Co., Limited (Messrs. Pyman Brothers), London. The triple expansion engines, constructed at the Central Marine Engine Works of the shipbuilders, have cylinders 25, 41 and 68in., by 48in. stroke, with two boilers. Launched, 20th October.

Richardson, Duck & Co., Stockton.

CARGO steamer, single-deck type; "Watermouth." 393½ft., by 50ft., by 28ft. 11in.; 7,500 tons deadweight. Built for Messrs. Anning Brothers, Cardiff. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, have cylinders 25, 42 and 68in., by 45in. stroke, with two boilers working under Howden's forced draught. Launched, 15th November.

Ropner & Sons, Ltd., Stockton.

CARGO steamer; 389½ft., by "Levenpool." 57½ft., by 28½ft. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, indicate about 2,450 H.P., and take steam from three boilers. Launched, 16th December.

OTHER ENGLISH CENTRES.

Cammell, Laird & Co., Limited, Birkenhead.

PASSENGER steamer; 159ft. by "Ceara." 32ft., by 9ft. Built to the order of Messrs. R. Singlehurst & Co., Ltd., for service on the River Amazon. The vessel has three decks—main, upper, and shade. On the upper deck there is a teak house, which contains the captain's and owners' cabins, and 24 double-berth cabins, providing accommodation for 48 passengers. A ladies' cabin is situated on the upper deck, and a dining saloon is also provided. The triple expansion engines have cylinders 13½, 23 and 35in., by 24in. stroke, with one boiler, giving the vessel a speed of 11 knots. Launched at the Birkenhead Works, 19th November.

Cochrane & Sons, Selby.

CARGO steamer; 127ft., by "Hull Trader." 22½ft., by 9ft. 7in. Built for Mr. F. W. Morlock, Mistley, Essex. The triple expansion engines were constructed by Messrs. Crabtree & Co., Ltd., Great Yarmouth. Launched, 17th December.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

PASSENGER and cargo steamer, "Bury." single-deck type; 265ft., by 36ft., by 18½ft. The vessel is the fourth of the five ordered from these builders by the Great Central Railway Co., for the quick service between Grimsby and Hamburg. State-rooms for about 100 first-class passengers are

Proceedings of the Technical Societies.

American Society of Naval Architects and Marine Engineers.

“Notes on the Armaments of Battleships,” by Sir Wm. H. White, K.C.B. (17th November.)

“The Evolution of Screw Propulsion in the United States, Part II.; American Clipper and Large Paddle-Wheel Steamers,” by Mr. Charles H. Cramp. (17th November.)

“The History and Economic Value of Canals, with special reference to the Cape Cod Canal,” by Commodore J. W. Miller. (17th November.)

“Coaling Warships; Notes of Progress,” by Mr. Spencer Miller. (17th November.)

“Floating Dry Docks in the United States; Relative Value of Wood and Steel for their Construction,” by Mr. William T. Donnelly. (17th November.)

“Our Constitutional Shipping Policy, and the Compact for its Establishment,” by Mr. W. W. Bates. (17th November.)

“An Analysis of Tests of Watertight Bulkheads, with Practical Rules and Tables for their Construction,” by Professor Wm. Hovgaard. (18th November.)

“Comparative Results in Steam and Coal Consumption, with Turbines, Reciprocating Engines, and a Combination of the Two in the Steam Yacht *Vanadis*,” by Mr. Clinton H. Crane. (18th November.)

“The Gyroscope for Marine Purposes,” by Mr. E. A. Sperry. (18th November.)

“New Propelling Machinery of s.s. *Creole*,” by Mr. John F. Metten. (18th November.)

“Some Suggestions for Reducing Loss by Fire on Shipboard,” by Mr. S. D. McComb. (18th November.)

“Two Marine Installations of Producer Gas Power,” by Mr. Chas. B. Page. (18th November.)

Schiffbautechnische Gesellschaft.

“Further Development in the Construction of Continuous-Flow Steam Engines,” by Professor J. Stumpf. (17th November.)

“The Construction of Turrets for Heavy Guns on Board Ship,” by Fregatten Kapitän Thorbecke. (17th November.)

“Diesel Engines for Ships,” by Direktor Th. Sauberlich. (17th November.)

“Temperature Measurement on War and Merchant Ships,” by Herr Otto Weiss. (17th November.)

“Phenomena of Motion attending the Firing of a Shot,” by Professor Dr. C. Cranz. (18th November.)

“Water Chambers for Reducing the Rolling of Ships, and their Successful Application in Practice,” by Direktor H. Frahm. (18th November.)

“The Development by means of Model Experiments of a New Type of Towing Steamer for Canals,” by Herr Fr. Gebers, Dr. Ing. (18th November.)

“The Use of Superheated Steam and Lentz Valve Gear for Marine Reciprocating Engines,” by Herr L. Lichtensteiner. (18th November.)

Institute of Marine Engineers.

“The Steam Engine Indicator and its Diagram,” by Mr. W. G. Winterburn. (21st November.)

“The History and Practice of Lubrication in Marine Engines,” by Mr. J. Veitch Wilson. (19th December.)

Liverpool Engineering Society.

“Ship Model Experiment Tanks; Their Purpose and Application,” by Professor W. S. Abell. (16th November.)

Institution of Engineers and Shipbuilders in Scotland.

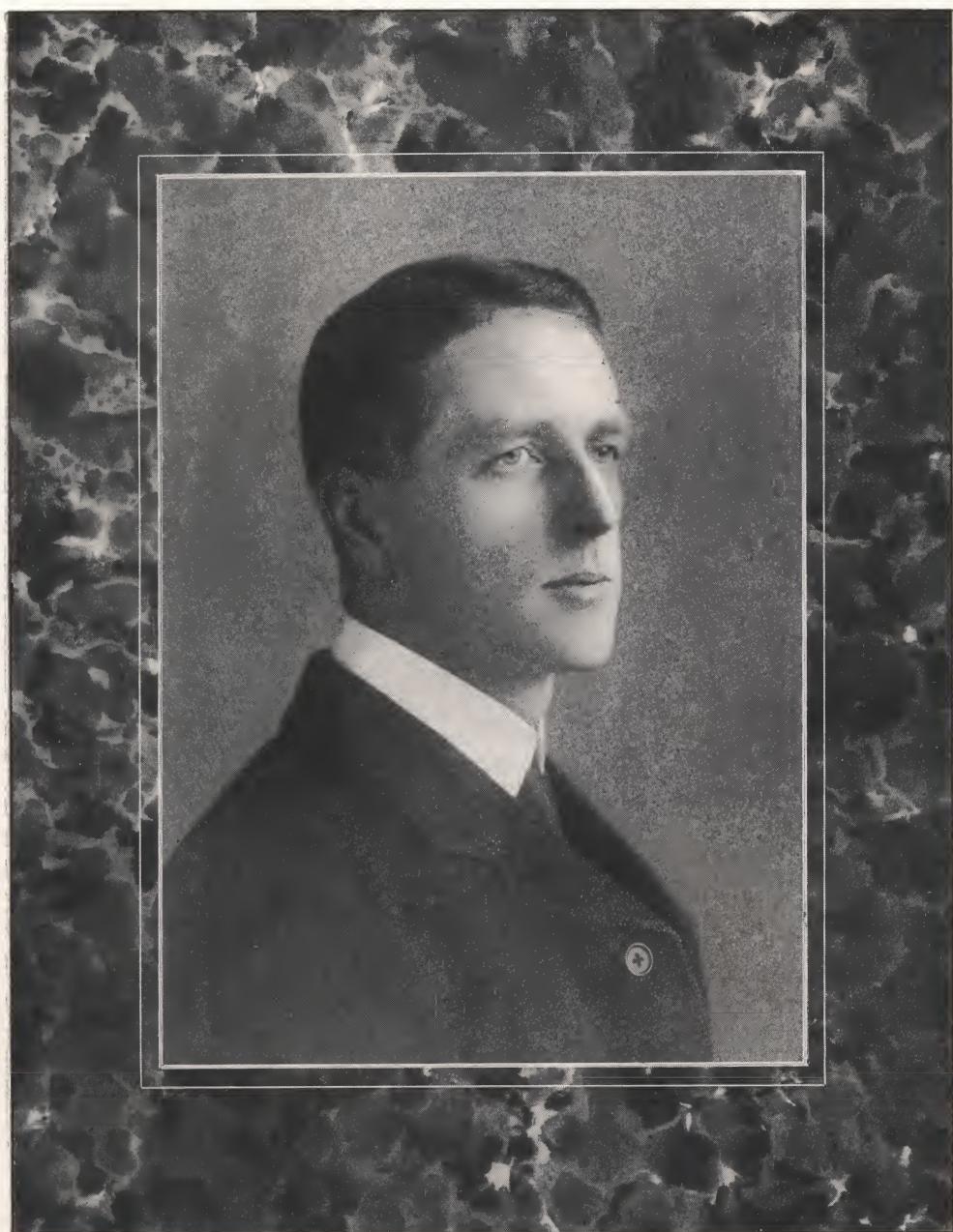
“The Block Coefficient,” by Mr. P. A. Hillhouse, B.Sc. (25th October.)

“The Detection of Petroleum Vapour or Gas,” by Mr. John H. Heck. (22nd November.)

“Boiler Economics and the Use of High Gas Speeds,” by Professor J. T. Nicolson, D.Sc. (20th December.)

North-East Coast Institution of Engineers and Shipbuilders.

“The Economical Working of Reciprocating Marine Engines and their Auxiliaries,” by Mr. D. B. Morison. (25th November.)



MR. ALFRED A. BOOTH.

Mr. Alfred A. Booth is the Chairman of the Cunard Steamship Company, whose new twin-screw Atlantic steamship *Franconia* is dealt with elsewhere in the present issue. The second son of Mr. Alfred Booth, J.P., and nephew of the Rt. Hon. Charles Booth, the well-known philanthropist, Mr. Booth received his education at Harrow and King's College, Cambridge, where he graduated as Wrangler in the Mathematical Tripos in 1894. On leaving Cambridge, he entered the office of the Booth Line and became a member of the firm of Alfred Booth & Co., shipowners. He joined the Cunard directorate in December, 1901, was elected deputy-chairman of the company in April, 1909, and

in October, 1909, on the death of Mr. William Watson, became chairman of the company. Under the direction of Mr. Booth it is evident that the vigorous and progressive policy of the Cunard Steamship Company is to be fully maintained, for since he became chairman no less than three important new Atlantic vessels have been contracted for by the company, the *Franconia* and *Laconia*, ordered from Messrs. Swan, Hunter, and Wigham Richardson, Wallsend, and the 23-knot quad-screw steamship *Aquitania*, of about 50,000 gross tons, now in an early stage of construction by Messrs. John Brown & Co., Clydebank.

THE SHIPBUILDER.

A Quarterly Magazine devoted to
The Shipbuilding, Marine Engineering and Allied Industries.

Edited by A. G. HOOD.

VOL. V.

SPRING NUMBER, 1911.

No. 20.

A Special "Olympic" and "Titanic" Souvenir Number of "The Shipbuilder."

AS announced in the last issue of *The Shipbuilder*, we have made arrangements to publish in June, about midway between our ordinary Spring and Summer Numbers, an *additional* number entirely devoted to the new Royal Mail Triple-screw White Star Liners *Olympic* and *Titanic*, the first of which, now completing at Belfast, will leave Southampton on the 14th June on her maiden voyage to New York. By arrangement with Messrs. Ismay, Imrie & Co., the managing owners, and Messrs. Harland and Wolff, the builders of the ships, both of whom are placing full data at our disposal, this issue will contain a complete technical description of the vessels, their combined four-cylinder triple expansion reciprocating and low-pressure turbine propelling machinery, and auxiliaries; and will include numerous plans and drawings, coloured and black and white illustrations of the ships, their passenger accommodation, etc., etc.

Our forthcoming special *Olympic* and *Titanic* Souvenir Number will be by far the fullest and most authentic account published of these epoch-marking steamships, the largest so far built, and as such we venture the opinion that it will permanently be regarded as an authoritative work of reference concerning their construction and equipment. In the preparation of this number we are following on the general lines of the *Mauretania* Souvenir Number of *The Shipbuilder*, many thousands of which

have been purchased by readers all over the world. Although published nearly three and a half years ago, copies of the *Mauretania* Number have sold steadily until a few weeks ago, when the last copies in print were disposed of.

The *Olympic* and *Titanic* Souvenir Number, as already explained, will be additional to our ordinary quarterly issues, will be about three times their size, and will be published in June at the price of 2s. net, or 2s. 4d. post free to any part of the British Isles and 2s. 8d. to all places abroad. In order to save our regular subscribers trouble, we desire to announce that, unless contrary instructions are received, we shall forward as soon as published to all readers whose subscriptions have been prepaid, a copy of the *Olympic* and *Titanic* Number, debiting the cost of same to the account standing in the name of each subscriber. This was the course adopted in the case of our additional *Mauretania* Number, and was found a convenience to all concerned. For the benefit of other readers, order forms will be found near the end of the present issue, or copies of the special number may be purchased through all newsagents. Orders have already been received for some thousands of copies, but the numerous foreign readers who have written us on the subject are assured that their copies will be despatched at the same time as those intended for our regular subscribers resident in the British Isles.

[Frank & Sons, So. Shields]

Fig. 1.—The Cunard Twin-screw Steamer "Franconia,"

Photo by



The Cunard Twin-Screw Steamer "Franconia."

FHE Cunard liner *Franconia*, recently completed by Messrs. Swan, Hunter, and Wigham Richardson, Ltd., with propelling machinery by the Wallsend Slipway & Engineering Company, and the sister ship *Laconia*, now in course of construction at the Wallsend Shipyard, have been specially designed for the Liverpool-Boston service of the Cunard Steamship Company. Their advent is an indication that Mr. Alfred A. Booth and his co-directors are determined to maintain the leading position the company now occupies, a determination which is finding practical expression in the able efforts of Mr. A. D. Mearns, the general manager of the company, and his colleagues in Liverpool and elsewhere. In every respect except speed these two vessels will bear comparison with the most celebrated Atlantic liners, and in comfort and extent of passenger accommodation the *Franconia* excels any ship of her size afloat. Mr. L. Peskett, the Cunard Company's naval architect, to whose designs and under whose superintendence the ship has been built, and Mr. J. Currie, the superintendent engineer, as well as the builders of the ship and engines, are to be congratulated upon the result achieved.

It is interesting to note that Messrs. Swan, Hunter, & Wigham Richardson since 1898 have constructed no less than nine vessels, of approximately 200,000 tons displacement, which have passed, or will pass, into the Cunard fleet. These include the *Mauretania*, *Ivernia*, *Carpathia*, *Ultonia*, *Franconia*, *Laconia*, and the three vessels recently purchased by the Cunard Company for their Canadian trade and now named the *Ascania*, *Ausonia*, and *Albania*. The *Laconia*, the sister ship to the *Franconia*, is now on the stocks and the *Ascania* is completing afloat at the Wallsend Shipyard.

The general arrangement of the *Franconia* is shown by the elevation and deck plans reproduced in Plates I., II. and III., while her graceful appearance will be seen from the view of the vessel off the Tyne given in Fig. 1. The following are her leading particulars :—

Length overall.....	625ft. 0in.
Length B.P.	600ft. 0in.
Breadth moulded	71ft. 0in.
Breadth extreme.....	71ft. 4in.
Depth moulded to B deck.....	60ft. 3in.
Load draught	29ft. 6in.

Load displacement.....	24,300 tons.
Gross tonnage	18,150
Speed at sea.....	16 knots.
Number of first-class passengers.....	250
Number of second-class passengers.....	450
Number of third-class passengers	2,200
Number of officers and crew.....	450

Total passengers and crew..... 3,350

The vessel has in all seven decks, *viz.*, the boat, promenade, saloon, shelter, upper, main, and lower decks, named respectively the A, B, C, D, E, F and G decks. As will be seen from the midship section Fig. 2, the main structure extends to the B deck for half the length of the vessel, the portion above the B deck being treated as an erection of lighter scantlings only. The scantlings shown in Fig. 2 indicate that ample strength has been provided in all directions; and as the ratio of length to depth to the strength deck B is only 10, the vessel is exceptionally strong longitudinally. Her proportions of beam to depth are such that she will be a very easy sea boat, but as an additional precaution against rolling she is provided with bilge keels on each side. Watertight subdivision has been carefully considered, there being fourteen transverse watertight bulkheads, the necessary openings in which can be closed by watertight doors controlled from above the load water line.

The keel of the vessel was laid by the 8th October, 1909, and the construction proceeded rapidly, the two photographs reproduced in Figs. 3 and 4 showing the progress made by the beginning of 1910 and the following May respectively. Fig. 4 is specially interesting as showing the great height and amount of staging required to complete the plating and riveting of a large vessel of this class. The *Franconia* was successfully launched on the 23rd July, 1910, and her launching weight—10,500 tons—entitles her to rank as the heaviest ship put into the water at Wallsend with the exception of the *Mauretania*. The vessel finally left the Tyne on the 21st January, 1911, and was handed over to her owners in Liverpool on the 23rd, about sixteen months after signing the contract, a very good performance for a vessel of this size.

Coming now to a description of the passenger accommodation of the *Franconia*, this embodies all the comforts which the unrivalled experience of the Cunard Company has led them so well to



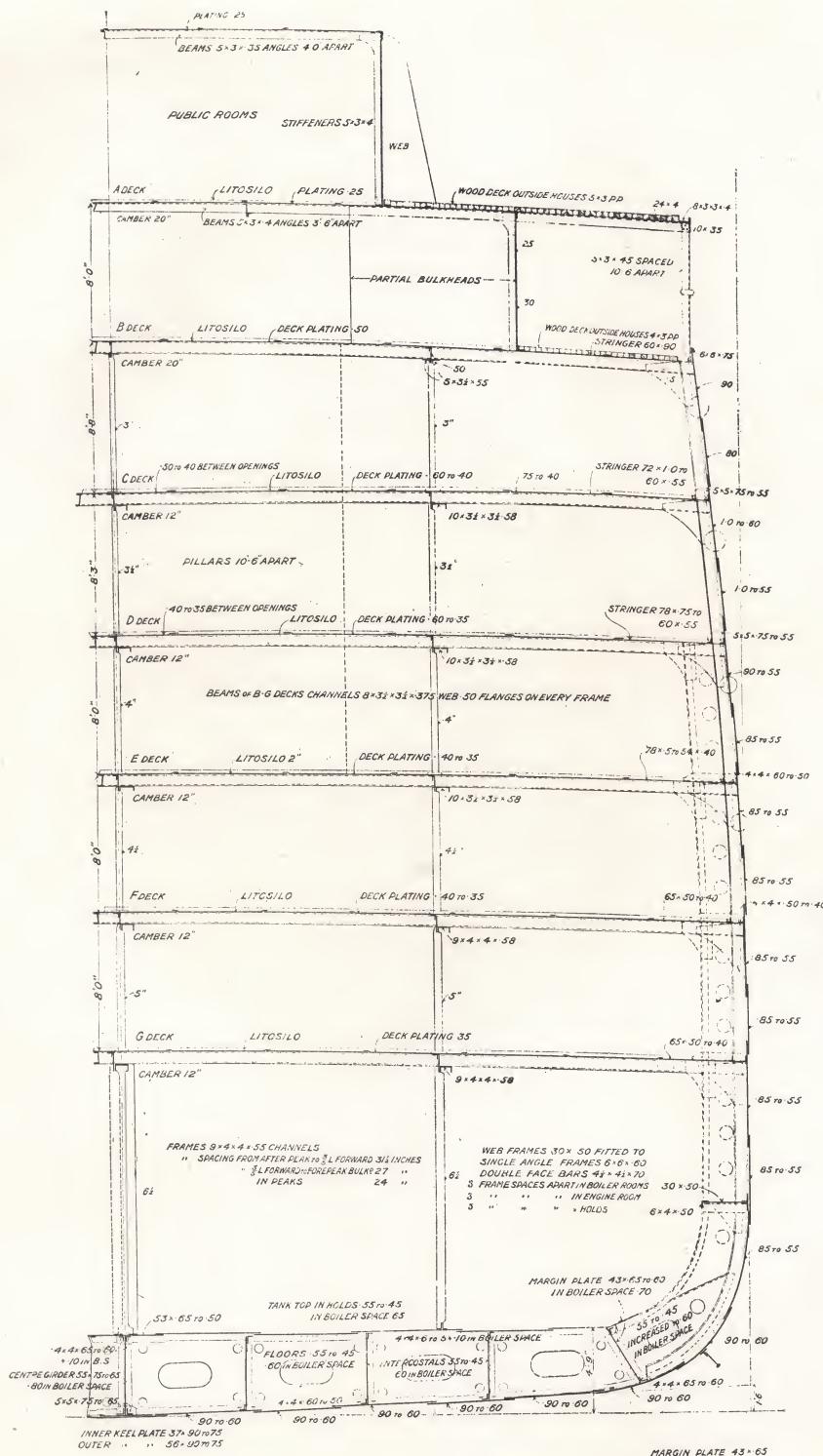


Fig. 2.—Midship Section of "Franconia."

tastefully arranged library and lounge, Fig. 12, fitted out in pine, painted and enamelled white. The third-class passengers have two large dining saloons situated on the main deck F, and other commodious rooms on the decks above.

The *Franconia* is thoroughly up-to-date as regards all the appliances and fittings required for a vessel of her class. The questions of ventilation, heating, the various water services, and sanitary fittings, have been very carefully considered and excellent results achieved. Electricity for power and lighting is supplied from a central station of 400 kilowatts capacity, situated at the after end of the main engine room. Three dynamos are provided, each driven by a vertical high-speed engine. The sub-contractors for the whole electrical installation were Messrs. W. C. Martin & Co., of Glasgow. The culinary arrangements are necessarily very extensive. The first and second-class kitchens, sculleries, etc., are conveniently situated between the first and second-class dining saloons; while the third-class galley is situated on E deck forward, in close proximity to the third-class saloon. The entire kitchen outfit, which includes the main cooking range, grills, *bain-maries*, steam ovens, patent roasters, meat-slicing machines, dough



Mr. L. Peskett.

mixers, bread provers, cake-making machines, dish-washing machines, coffee mills, hot presses, and other labour-saving contrivances too numerous to mention, has been supplied by the well-known specialists in cooking apparatus and pantry fittings, Messrs. Henry Wilson & Co., of Liverpool. The latest type of refrigerating plant for cooling the ship's provision rooms and cold cargo chambers has been supplied and fitted on board by Messrs. J. & E. Hall, Ltd., of Dartford, the refrigerating machinery being placed in a recess at the tank top level in the midship cross bunker.

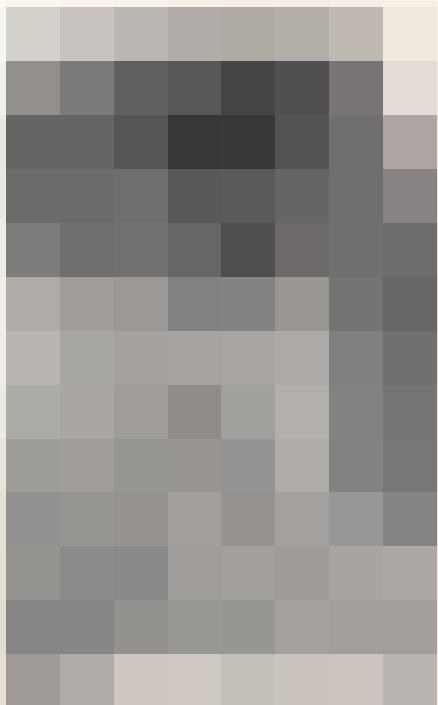
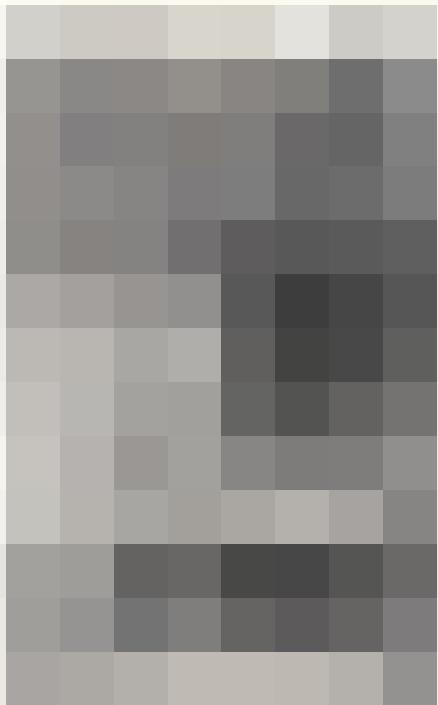
The steam steering gear is situated in a house on D deck aft, and is of the well-known Wilson and Pirrie type, supplied by Messrs. J. Hastie & Co., Greenock. The main bower anchors have a weight of $6\frac{1}{4}$ tons each and are attached to $3\frac{1}{6}$ -in. diameter stud link chain cables. The massive windlass required for operating cables of such large size was made by Messrs. J. H. Wilson & Co., of Liverpool, who also supplied the remaining deck machinery, consisting of two warping capstans aft with cylinders 14in. diameter by 10in. stroke, two large warping winches 12in. diameter by 16in. stroke, ten cargo winches 8in. diameter by 12in. stroke, and four boat-hoisting winches 6in. diameter by 8in. stroke.



Mr. J. Currie.














Fig. 14.—The "Franconia's" Engine Room: Cylinder Tops.


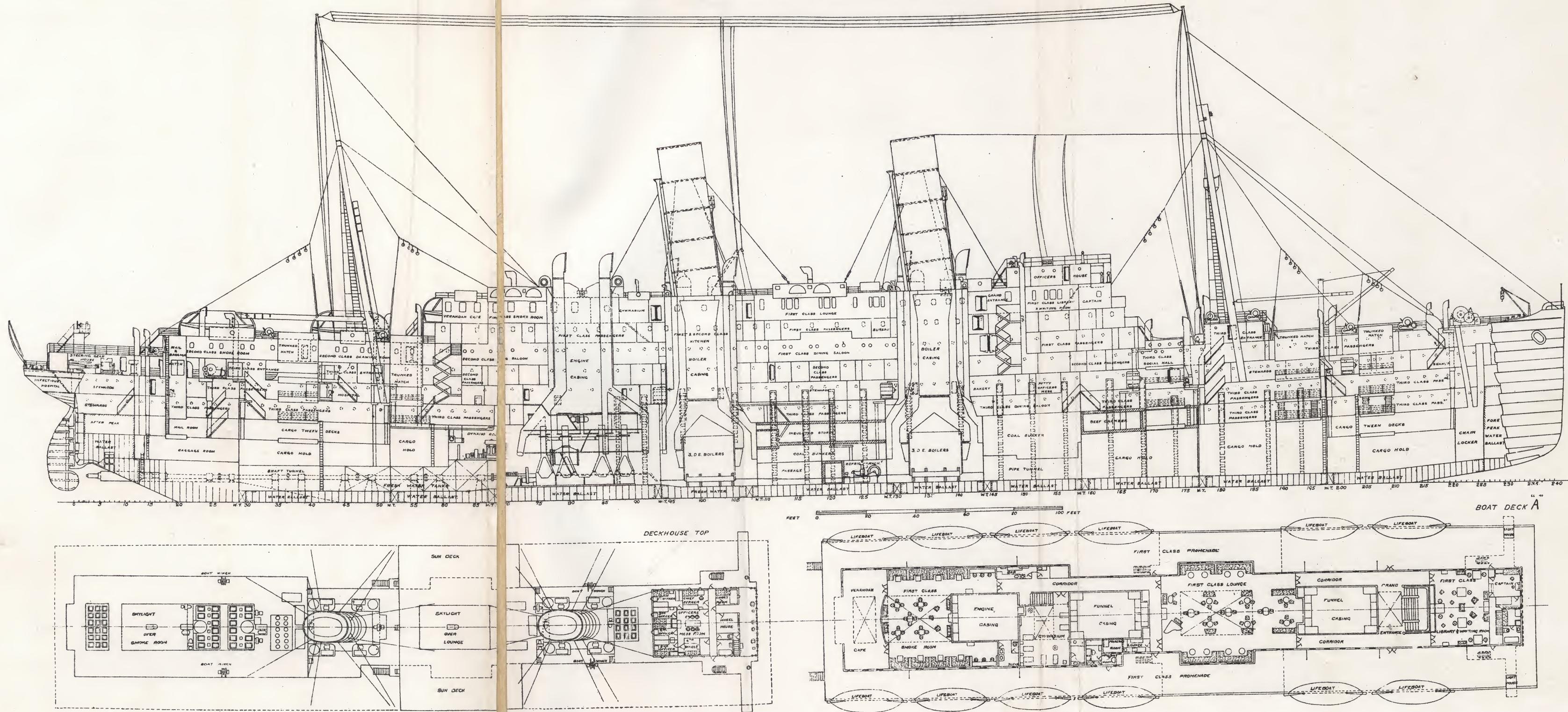
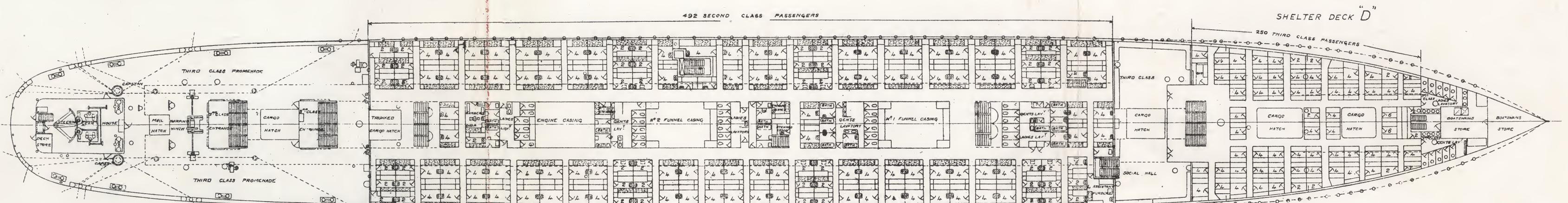
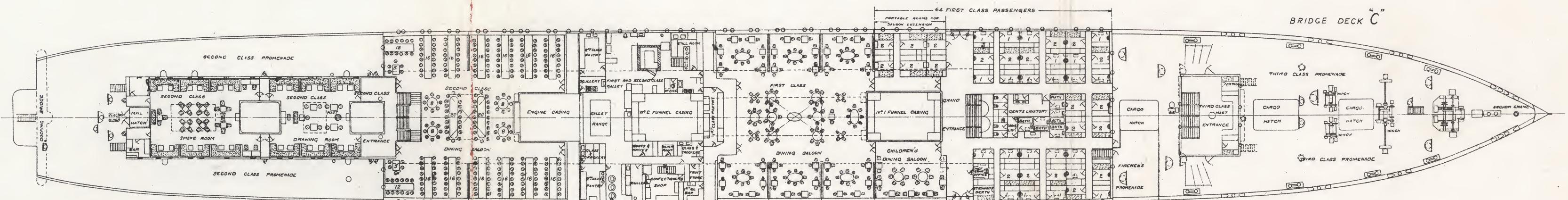
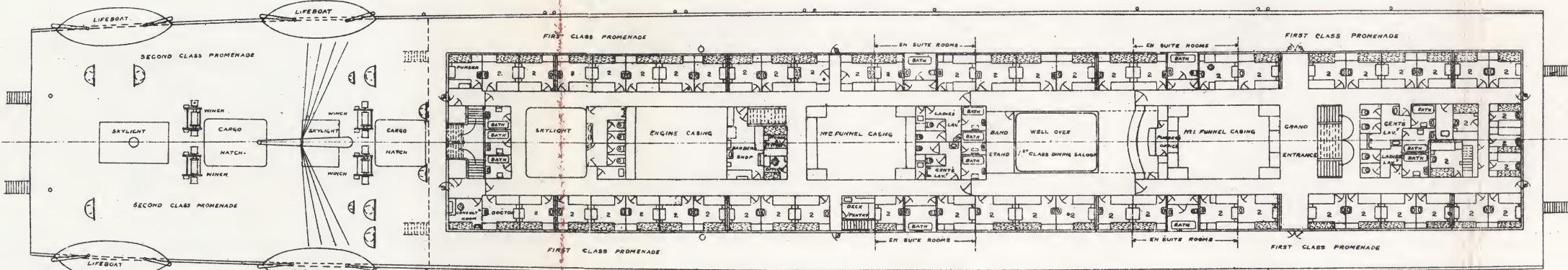
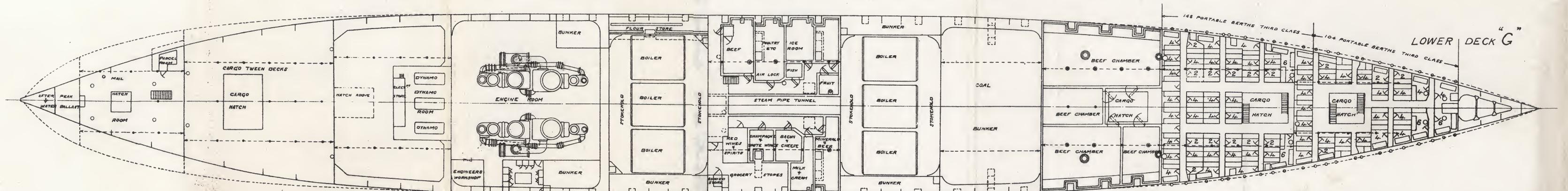
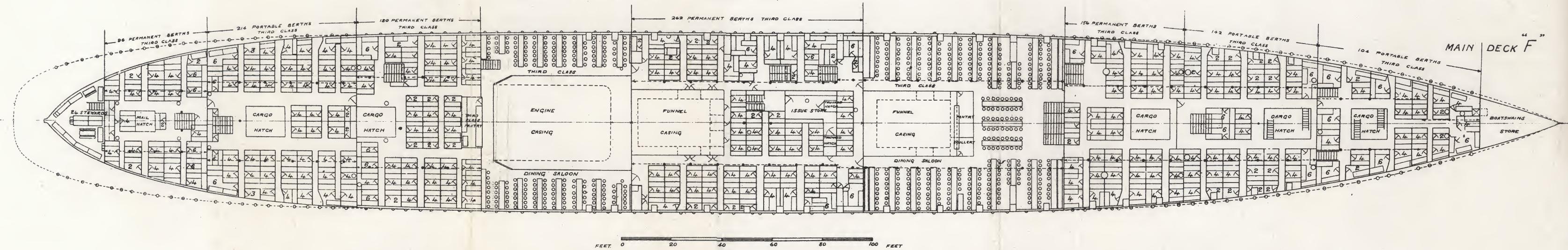
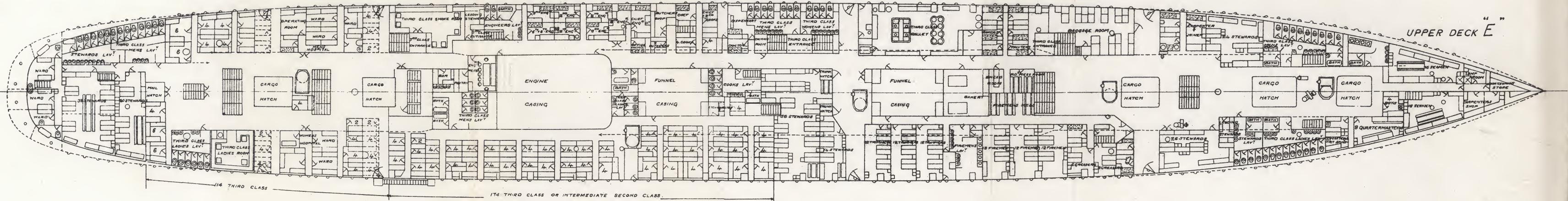
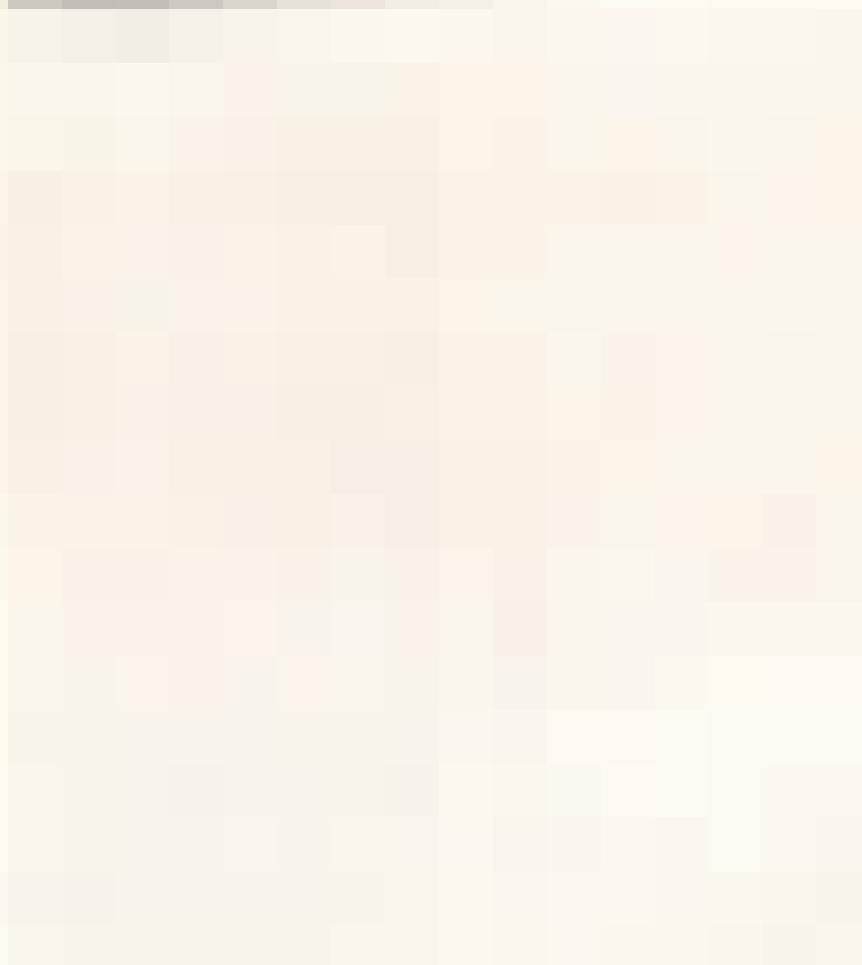


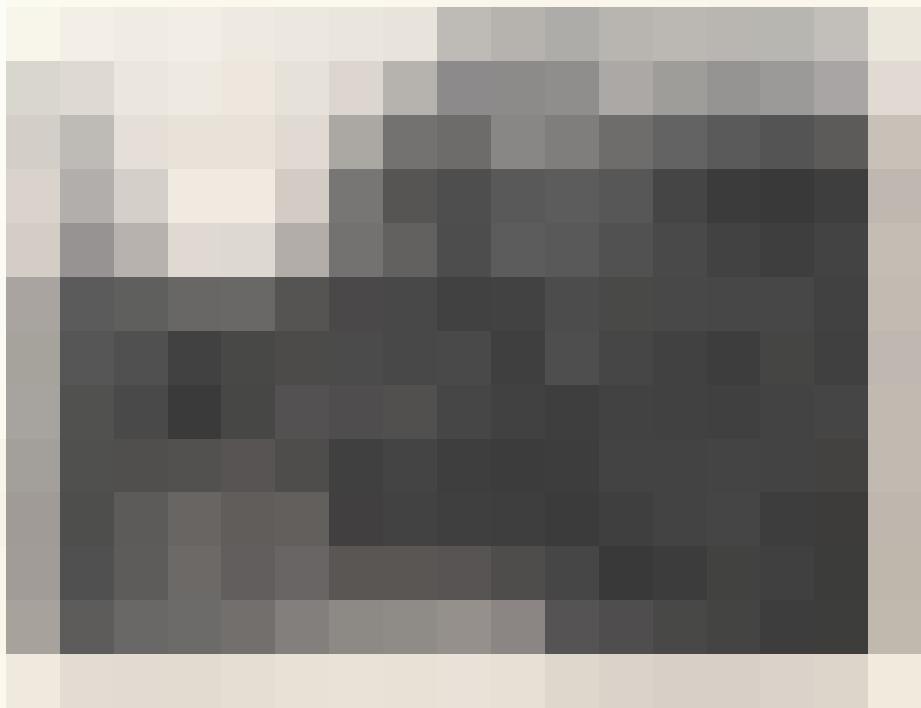
Fig. 15.—The "Franconia's" Engine Room: Starting Platform.







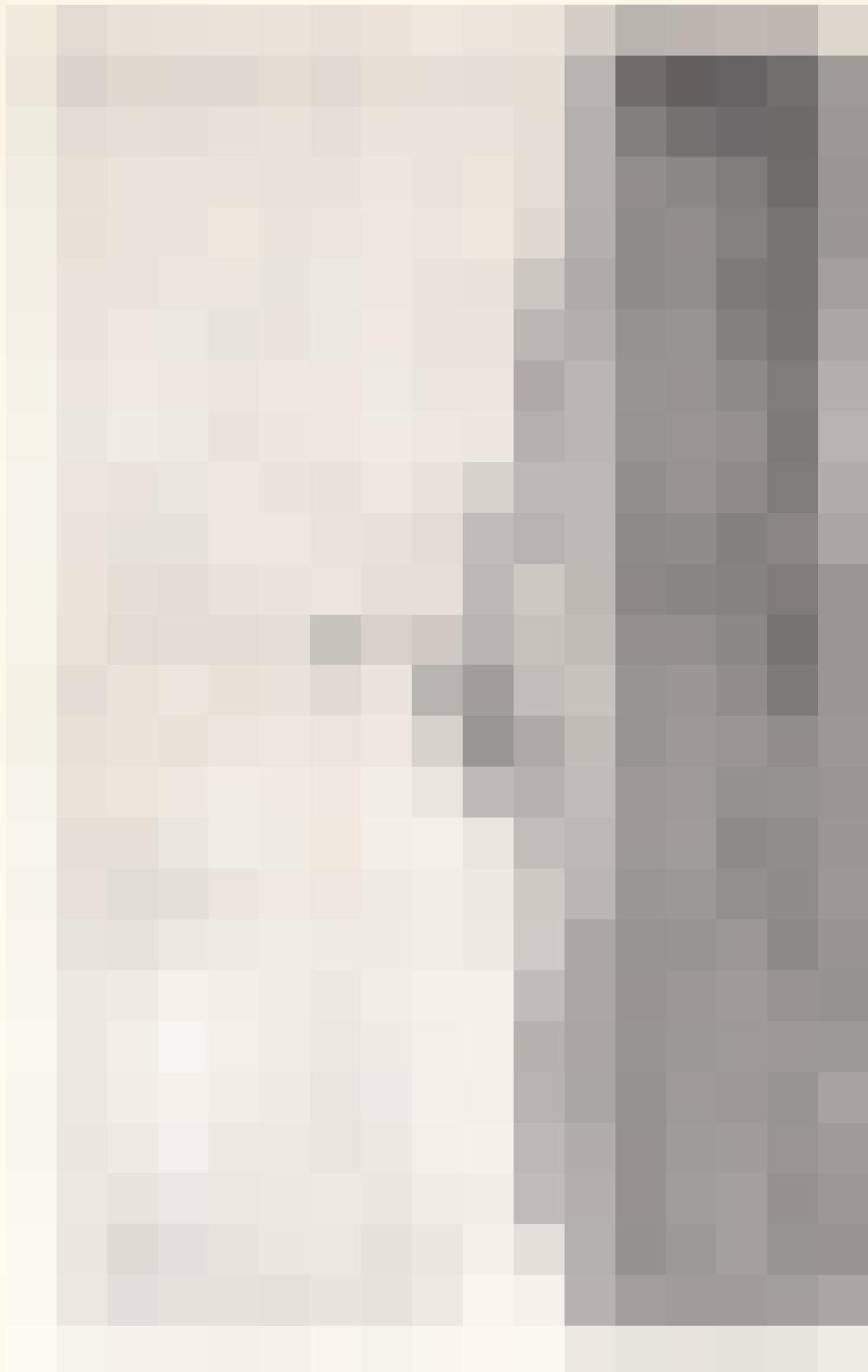














are situated on the bridge and awning decks. The bridge deck is devoted entirely to single-berth cabins, which can, however, be made inter-communicable if required, while the awning deck accommodation is composed of Bibby "tendem" cabins of large size. The proportion of single-berth cabins is extraordinarily high. The third-class accommodation is situated on the poop, main, and 'tween decks, and comprises single, two, four, six, and eight-berth cabins. The *Themistocles* is the first ship yet built with single-berth cabins for third-class passengers. The third-class dining saloon extends the width of the vessel and seats about 250 persons. The smoking room and general room are placed on the awning deck. The propelling machinery consists of two sets of quadruple expansion engines, and the vessel has sufficient speed to make the passage between London and Melbourne in forty days. Trial trip, 14th January.

“Demosthenes.” TRIPLE-SCREW passenger and cargo steamer. The vessel was built for the same owners, and is a sister ship to the *Themistocles* with the exception that she has three screws, driven by two sets of reciprocating engines and a low-pressure turbine. Launched, 28th February.

Workman, Clark & Co., Ltd., Belfast.

“Aracataca.” PASSENGER and fruit-carrying steamer; 390ft. long; 4,150 gross tonnage. Built to the order of Messrs. Elders & Fyffes, Ltd., London, for their service between the West Indies and British Ports. The staterooms are situated on the upper deck adjoining the dining saloon and in a steel house on the bridge deck. The cargo spaces are specially insulated and fitted for the carriage of fruit in bulk. The fruit will be kept in good condition during the voyage by fresh air delivered continuously by large fans through ducts to each compartment, the air being cooled by passing through cooler rooms. The triple expansion engines, taking steam from four boilers fitted with Howden's forced draught, were constructed by the shipbuilders. Trial trip, 3rd March.

“Anchises.” TWIN-SCREW passenger and cargo steamer; 509ft. long; 10,050 gross tonnage. Built to the order of the Ocean Steamship Company (Messrs. Alfred Holt & Co.), Liverpool, for their Australian trade. The vessel is a sister ship to the *Aeneas*, described and illustrated in our last issue. Trial trip, 10th March.

“Egra.” TWIN-SCREW passenger and cargo steamer; 424ft. long; 5,000 gross tonnage. Built to the order of the British India Steam Navigation Co., Ltd., for service in the tropics. Accommodation is provided on the shade deck for about 50 first and 40 second-class passengers, the rooms being arranged for one, two or three persons. The first-class public rooms are situated on the bridge deck, and include a dining saloon, social hall, and smoking room. For the second-class passengers a large dining room is provided on the shade deck. The 'tween decks are arranged for the accommodation of native steerage passengers. The cargo is carried in three holds. The propelling machinery consists of two sets of triple expansion engines, with four boilers working under forced draught. Launched, 14th March.

“Neleus.” PASSENGER and cargo steamer; 457ft. long; 6,700 gross tonnage. Built to the order of Messrs. Alfred Holt & Co., Liverpool, for service to the Far East. The vessel is constructed on the fore and aft girder principle, thus ensuring unobstructed cargo space in the holds and 'tween decks. The cargo space is divided into four main compartments and two smaller ones, the latter being also arranged for use as water ballast tanks. Accommodation for a number of saloon passengers is provided in staterooms on the boat deck. The after end of the main deck is arranged for emigrants, and accommodation for steerage passengers is situated in the forecastle. The propelling machinery, constructed by the ship-builders, consists of a set of triple expansion engines and two boilers. The *Neleus* is the twenty-eighth vessel built by Messrs. Workman, Clark & Co. for the same owners. Trial trip, 23rd March.

SCOTLAND.

Barclay, Curle & Co., Ltd., Whiteinch.

“Edavana.” TWIN-SCREW passenger and cargo steamer; 412ft., by 52 $\frac{1}{2}$ ft., by 36ft. Built to the order of the British India Steam Navigation Company, for

their Eastern trade. Accommodation is provided for 50 first-class, 40 second, and a large number of native passengers. The two sets of reciprocating engines were constructed by the ship-builders, and give the vessel a speed of 14 knots.

A forty-eight hours' trial was completed on the 30th March, when a speed of 17 knots was maintained throughout.

TWIN-SCREW passenger and cargo steamer. The vessel is a sister ship to the *Edavanaugh*, and was built for the same owners. Launched, 31st March.

George Brown & Co., Greenock.

CARGO steamer; 160 ft. long. Built for the African Association, Liverpool.

The propelling machinery was constructed by Messrs. Gauldie, Gillespie and Co., Glasgow. Launched, 2nd March.

TWIN-SCREW cargo steamer; 160ft., by 26ft., by 12 $\frac{1}{4}$ ft. Built to the order of foreign owners for coasting trades. The two sets of compound surface-condensing engines were constructed by Messrs. Gauldie, Gillespie & Co., Glasgow. Launched, 29th March.

John Brown & Co., Ltd., Clydebank.

TWIN-SCREW passenger and cargo steamer, shelter-deck type; 11,000 gross tonnage.

Built to the order of the Scottish Shire Line, Glasgow, for trade between Australia and British ports. Four of the holds and 'tween decks are insulated for the carriage of frozen mutton, fruit, and dairy produce. The two sets of refrigerating machinery are placed on the upper deck. The propelling machinery consists of two sets of quadruple expansion engines, taking steam from four boilers. Launched, 27th February.

STEAM yacht; 267ft. overall, by 31ft., by 18 $\frac{3}{4}$ ft. to upper deck; over 900 gross tonnage; built to the order of Mr. H. Livesey, from designs prepared by the shipbuilders in conjunction with Messrs. G. L. Watson & Co. A promenade deck, the full breadth of the vessel, extends for a length of about 130ft. On this deck the owner's business room and smoking room have been arranged. On the upper deck a large deckhouse contains a dining room, drawing room, cloak room, lavatories, and vestibules; while on the cabin deck the owner's bedroom (extending the full breadth of the vessel) and the principal staterooms are placed forward, with a number of large staterooms abaft the machinery space. The panelling and decorations will be completed by the builders, and the furniture and upholstery will be supplied by Messrs. Waring and Gillow and Messrs. Wylie

and Lockhead. The two sets of four-cylinder triple expansion engines take steam from two boilers, and will give the vessel a high speed. Launched, 29th March.

Caird & Co., Greenock.

TWIN-SCREW mail and passenger steamer; 570ft., by 63ft., by 48ft. depth to hurricane deck;

12,500 gross tonnage. Built for the Peninsular and Oriental Steam Navigation Co. Accommodation is provided for 460 first and 220 second-class passengers. The lower 'tween decks are fitted for the carriage of mails. Two large refrigerating machines are installed, one for the passengers' apartments and the other for fruit and frozen meat cargoes. The two sets of quadruple expansion engines, constructed by the shipbuilders, develop 14,000 horse-power, and give the vessel a speed of 18 knots. Launched, 14th March.

Caledon Shipbuilding & Eng. Co., Ltd., Dundee.

CARGO steamer; 291ft., by 35 $\frac{1}{2}$ ft., by 18ft. 2 $\frac{1}{2}$ in. The vessel is the thirty-sixth built at the same yard for the Clyde Shipping Co., Glasgow. Launched, 1st February.

Andorhina. PASSENGER and fruit-carrying steamer; 301ft. long; 3,000 gross tonnage. Built to the order of Messrs. Yeoward Brothers, Liverpool, for their trade between the Canary Islands and Liverpool. The triple expansion engines, constructed by the shipbuilders, take steam from three boilers, and are capable of driving the vessel at a speed of 15 knots. The *Andorhina* is the sixteenth vessel built by the Caledon Company for the same owners. Launched, 2nd March.

Campbeltown Shipbuilding Co., Campbeltown.

CARGO steamer; 5,500 tons dead-weight. Built for Messrs. J. and P. Hutchison, Glasgow. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. The *Amphion* is the largest vessel so far built at Campbeltown. Launched, 31st January.

CARGO steamer; 2,000 tons dead-weight. Built to the order of the Union Steamship Co. of New Zealand, for the Australian and New Zealand coasting trade. The propelling machinery was constructed by Messrs. David Rowan and Co., Glasgow. Trial trip, 14th March.

Clyde Shipbldg. & Eng. Co., Ltd., Port-Glasgow.

CARGO steamer; 295ft., by 43ft., "Ussa." by 29 $\frac{1}{2}$ ft. Built for the Baltic trade. The propelling machinery was constructed by the shipbuilders. Launched, 15th February.

Charles Connell & Co., Limited, Scotstoun.

CARGO steamer, shelter-deck type; 404ft., by 53ft., by 28 $\frac{1}{4}$ ft.; 8,400 tons deadweight. Built for Messrs. Thomas Law & Co., Glasgow. The triple expansion engines, by Messrs. Dunsmuir & Jackson, Govan, have cylinders 27, 45 and 74in., by 48in. stroke. Trial trip, 27th February.

PASSENGER and cargo steamer. "Davildar." Built for Messrs. Turner & Co., Liverpool. The first-class state-rooms are arranged on the bridge deck. The propelling machinery was constructed by Messrs. Dunsmuir & Jackson, Ltd., Govan. Launched, 16th March.

Dundee Shipbuilding Company, Dundee.

PADDLE passenger and cargo steamer; 175ft. long. Built to the order of foreign owners, for river traffic. Launched, 15th February.

PASSENGER and cargo steamer; "Guanabara." 140ft., by 29ft., by 8 $\frac{1}{2}$ ft. Built for service in Brazilian waters. Launched, 16th March.

Ferguson Brothers, Port-Glasgow.

SCREW tug; 122ft. long. "Flying Serpent." The vessel is the eighth screw tug built by Messrs. Ferguson Brothers for the Clyde Shipping Co., Glasgow. Launched, 1st February.

TWIN-SCREW combined suction and "Rhyl." grab dredger. Built to the order of the London and North Western Railway Co., for service at Garston. The four powerful grab cranes are arranged at each corner of the hopper, one of the forward cranes having an extended jib to reach over the bow for dredging in confined spaces. The sand pump is placed in a separate engine room, and is driven by a set of compound marine-type engines; the suction is fitted under the water-line, and has a slide for raising and housing the pipe inboard. The propelling machinery consists of two sets of triple

expansion engines, steam being supplied by two double-ended boilers. Launched, 2nd March.

Fleming & Ferguson, Ltd., Paisley.

SELF-PROPELLING bucket dredger. Built for the Townsville Harbour Board, North Queensland. Launched, 1st March.

John Fullerton & Co., Paisley.

CARGO steamer; 760 tons "White Rose." deadweight. Built to the order of Messrs. Richard Hughes & Co., Liverpool, for their coasting trade. The triple expansion engines were constructed by Messrs. Ross & Duncan, Govan. Launched, 16th March.

Greenock & Grangemouth Dockyard Co., Ltd.

PASSENGER steamer; 185ft., by "Satyavati." 27 $\frac{1}{2}$ ft., by 17ft. Built to the order of the Bombay Steam Navigation Co., for their pilgrim and passenger service. The triple expansion engines were constructed by Messrs. Dunsmuir & Jackson, Ltd., Launched, 28th February.

OIL tank steamer. The vessel is "Burma." the first of this type specially constructed to the order of the British Admiralty, although not the first acquired. 2,500 tons of oil fuel are carried in twelve tanks, and the vessel is capable of delivering oil while towing a warship or being towed. She can also deliver oil alongside from four different positions on the port and starboard side. The pump room is situated forward of the engine room, and contains two powerful pumps capable of discharging 400 tons per hour. A system of overhead trolley railways, situated in the 'tween decks, is provided for the conveyance of coal when required from the 'tween decks to the stokehold. The propelling machinery was constructed by Messrs. John G. Kincaid & Co., Ltd., Greenock, and is fitted aft, giving the vessel a sea speed of 12 knots. Launched at Greenock, 3rd March.

Wm. Hamilton & Co., Ltd., Port-Glasgow.

CARGO steamer; 390ft., "Saint Stephen." by 52ft., by 28ft. to upper deck; 7,300 tons deadweight. Built on the Isherwood system of longitudinal framing for Messrs. Rankin, Gilmour and Co., Ltd., Liverpool. The triple expansion engines, by Messrs. David Rowan & Co., Glasgow, have cylinders 25, 41 and 68in., by 48in. stroke, with three boilers. Launched, 2nd March.

D. & W. Henderson & Co., Ltd., Partick.

"San Guglielmo." TWIN-SCREW passenger and emigrant steamer ; 490ft., by 56 $\frac{1}{4}$ ft., by 36 $\frac{1}{4}$ ft. ; about 8,500 gross tonnage. Built to the order of Messrs. Peirce Brothers, Naples, for the emigrant trade between the Mediterranean and United States ports. Accommodation is provided for 2,000 passengers in all, divided into first, second, and third-class. The first-class accommodation is placed on the promenade deck, and comprises the usual public rooms, several suites of special bedrooms and sitting rooms with private bathrooms, and the rooms of the Italian Royal Commissioner. The second-class passengers are accommodated on the promenade and shelter decks. Accommodation for about 1,800 third-class passengers is provided in the 'tween decks and under the poop, with a dining room about 130ft. long on the shelter deck. An installation of Marconi wireless telegraphy for long distance is fitted. The two sets of triple expansion engines, constructed by the shipbuilders, have cylinders 25, 41 and 68 $\frac{1}{4}$ in., by 48in. stroke, and take steam from six boilers working at a pressure of 200lb. Launched, 29th March.

Napier & Miller, Ltd., Old Kilpatrick.

"Baron Polwarth." CARGO steamer ; 400ft., by 52ft., by 30ft. ; about 5,000 gross tonnage ; 8,000 tons deadweight. Built for Messrs. H. Hogarth & Sons, Glasgow. The triple expansion engines, by Messrs. Dunsmuir & Jackson, Ltd., have cylinders 27, 43 and 72in., by 48in. stroke, with two boilers. Launched, 27th February.

"Seal." STEAMER for the sealing trade ; 175ft., by 26 $\frac{1}{2}$ ft., by 20ft. 5 $\frac{1}{2}$ in. ; 520 gross tonnage. Built for Captain J. A. Farquhar, Halifax, N.S. The vessel is rigged as a two-masted schooner and has upper and shelter decks. She has been specially strengthened for working in ice when sealing off the Newfoundland coast. A system of wireless telegraphy is fitted. The triple expansion engines and one boiler were constructed by Messrs. Aitchison Blair, Ltd., Clydebank. Launched, 22nd March.

Russell & Co., Port-Glasgow.

"Cape Ortegal." CARGO steamer ; 4,700 gross tonnage. Built for the Lyle Shipping Co., Glasgow. The propelling machinery, of 2,000 I.H.P., was constructed by Messrs. Rankin and Blackmore, Greenock. Launched, 13th January.

"Lovat." CARGO steamer ; 404 $\frac{1}{2}$ ft., by 52ft., by 28ft. 10in. Built for Messrs. John Warrick & Co., Leith. The triple expansion engines, by Messrs. Dunsmuir and Jackson, Govan, have cylinders 27, 44 and 74in., by 48in. stroke. Launched, 2nd March.

"Trafalgar." CARGO steamer ; 385ft., by 52ft., by 29ft. ; 7,600 tons deadweight. Built for Messrs. Glen & Co., Glasgow. The propelling machinery was constructed by Messrs. David Rowan & Co., Glasgow. Launched, 13th March.

Scott's Shipbuilding & Eng. Co., Ltd., Greenock.

"Moacyr." TWIN-SCREW passenger and cargo steamer. Built for service on the River Amazon. The staterooms are on an entirely new design, and the saloon is placed in the forward end of the vessel, instead of aft as usual in this type of steamer. The main saloon opens outward on to an extra promenade deck. An illuminated skysign showing in colours is fitted, and the holds have electrical sounders indicating automatically the presence of water in any hold. The two sets of triple expansion engines were constructed by Messrs. Ross and Duncan, Govan. Launched, 22nd March.

"Atreus." CARGO steamer ; 440ft. long ; 7,500 tons deadweight. The vessel is the first of three building by Scott's Company for Messrs. Alfred Holt and Co., Liverpool. Launched, 27th January.

"Hildebrand." TWIN-SCREW passenger and cargo steamer ; 440ft., by 54ft., by 38ft. D.M. to shelter deck. Built for the Booth Steamship Co., Ltd., Liverpool. Accommodation is provided for 200 first and nearly 400 third-class passengers. The vessel has also large cargo-carrying capacity.

The two sets of quadruple expansion engines were constructed by the shipbuilders, and are balanced on the Yarrow, Schlick & Tweedy system. Launched, 4th February.

Alex. Stephen & Sons, Limited, Linthouse.

TWIN-SCREW passenger steamer ; "Ellenga." 425ft., by 52ft., by 35ft. Built to the order of the British India Steam Navigation Co., Ltd., for their Indian coastal service. The vessel has three complete decks, with bridge and boat decks above. Accommodation is provided for 50 first and 50 second-class passengers, and two complete decks are reserved for native passengers. The two sets of triple expansion engines, taking steam from two double-ended and two single-ended boilers, were constructed by the shipbuilders. Trial trip, 2nd March.

"Manzanares." PASSENGER and fruit-carrying steamer ; 390ft., by 48ft., by 32ft. ; 4,200 gross tonnage.

Built to the order of Messrs. Elders & Fyffes, Ltd., for their service between the West Indies, Central America, and Manchester. The passenger accommodation is contained in a large house on deck, with the usual public rooms. Insulated hold space of 200,000 cubic feet capacity is provided, cooled by refrigerating machinery on the CO₂ system by Messrs. J. & E. Hall, Dartford. The triple expansion engines have cylinders 27, 45 and 75in., by 54in. stroke. Launched, 4th March.

Yarrow & Co., Limited, Scotstoun.

TORPEDO boat, for the Danish "Soridderen." Government ; 181 $\frac{3}{4}$ ft. long, by 18 ft. beam. The propelling machinery consists of Brown-Curtis turbines, constructed by the shipbuilders, of about 4,000 S.H.P., steam being supplied by two Yarrow water-tube boilers. The vessel is expected to attain a speed of 27 knots, and is to serve as a type for other torpedo boats under construction in Denmark. Launched, 28th February.

THE TYNE.

Sir W. G. Armstrong, Whitworth & Co., Ltd.

CARGO steamer, single-deck type ; "Grof Khuen Hederváry." 390ft., by 52 $\frac{1}{4}$ ft., by 26ft. 4in. ; 7,200 tons dead-weight. Built for the "Atlantica" Sea Navigation Company, Budapest, of which Mr. Eugen Pollacsek is the Director General. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton, have cylinders 26, 42 and 68in., by 48in. stroke, with two boilers. Launched at Walker, 15th February.

"Sandefjord." CARGO steamer, shelter-deck type ; 452ft. long, by 58ft. extreme ; 10,650 tons dead-weight. Built on the Isherwood system of longitudinal framing to the order of Mr. P. A. Gron, Sandefjord, for the iron ore trade between Wabana, Newfoundland, and Sydney, C.B. The triple expansion engines, by the North Eastern Marine Engineering Co., Wallsend, have cylinders 28 $\frac{1}{2}$, 47 and 78in., by 54in. stroke, with three boilers working under Howden's forced draught. Trial trip, 20th March.

"Helvetia." CARGO steamer, single-deck type ; 389ft., by 52ft., by 30 $\frac{3}{4}$ ft. Built for Messrs. W. Lowden & Co., Liverpool. The triple expansion engines, by Messrs. George Clark, Ltd., Sunderland, have cylinders 26, 44 and 73in., by 48in. stroke, with three boilers. Launched at Walker, 28th March.

BATTLESHIP of the *Orion* type ; 545ft. B.P., by 88 $\frac{1}{2}$ ft. beam ; 22,500 tons displacement at a mean draught of 27 $\frac{1}{2}$ ft. The vessel is one of the four "contingent" armoured ships ordered by the British Government towards the close of the 1909-10 financial year, the others being the battleship *Thunderer* launched by the Thames Ironworks Company on the 1st February, the battleship *Conqueror* which will be launched by Messrs. William Beardmore & Co., Dalmuir, early in May, and the armoured cruiser *Princess Royal* building by Messrs. Vickers, Sons and Maxim, Barrow. The main armament consists of ten 13.5-inch guns, throwing a 1,250 lb. projectile, mounted in pairs in barbettes on the middle line of the ship. All these guns can be used on either broadside, but only four can be fired ahead and four astern. The vessel will also mount sixteen 4-inch guns, which will be well protected. Her thickest armour is 12 inches, as against 10 inches in the *Neptune*. The Parsons turbine propelling machinery, driving four shafts, will develop a shaft horse-power of 27,000 and give a speed of 21 knots. As in the case of the *Hercules*, *Neptune*, *Collingwood*, and *Temeraire*, the boilers are of the Yarrow large-tube type. The propelling machinery is being supplied by Messrs. R. & W. Hawthorn, Leslie & Co., Newcastle. The *Monarch* was exactly a year on the stocks, the first keel plate being laid on the 1st

April, 1910. She was launched with her boilers on board, a very large amount of armour in position, and the funnels and bridges erected. Launched at Elswick, 30th March.

Wm. Dobson & Co., Low Walker.

CARGO steamer, single-deck type ; 378ft., by 53 $\frac{1}{4}$ ft., by 26ft. 11in. ; 7,500 tons deadweight. Built for the Hungarian Levant Steamship Co., Budapest. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 24, 39 and 66in., by 45in. stroke, with three boilers. Launched, 14th February.

Jos. T. Eltringham & Co., South Shields.

CARGO vessel ; 120ft. B.P., by 22ft., by 11 $\frac{1}{2}$ ft. Built to the order of the Holzapfel Marine Gas Power Syndicate, Ltd., to demonstrate the applicability of suction gas as a means of propulsion. The propelling machinery, placed aft, consists of a set of high-speed six-cylinder vertical gas engines made by Messrs. E. S. Hindley & Sons, Bourton, Dorset. The engines have double ignition, and give 180 B.H.P. at 450 r.p.m. A Föttinger transformer is fitted to gear down the revolutions to an economical speed for the propeller. The gas plant, which is in duplicate, has been constructed by the Power Gas Corporation, Ltd., Stockton. The bunker to supply the gas producer is in the poop, and holds about 12 tons of anthracite. The consumption, it is expected, will be from 1 to 1 $\frac{1}{2}$ tons per day, as against about 3 $\frac{1}{2}$ tons for compound steam engines of equal power, generally used for vessels of the same size. Launched, 16th February.

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn.

PASSENGER and cargo steamer ; 355ft., by 50ft., by 26ft. ; over 6,100 tons deadweight. The vessel is the second of three building by Messrs. Hawthorn, Leslie & Co. to the order of the Booth Steamship Company for their South American trade. Accommodation for 46 first-class passengers is provided amidships, and for 100 steerage passengers in the shelter 'tween deck aft. Launched, 15th February.

CARGO steamer ; 388ft., by 51 $\frac{1}{4}$ ft., by 26 $\frac{3}{4}$ ft. ; 7,400 tons deadweight. Built for the Court Line, Limited (Messrs. Haldenstein & Co.), London. The triple expansion engines, by Messrs. Blair & Co., Ltd., Stockton,

have cylinders 26, 42 and 70in., by 48in. stroke, with three boilers. Launched, 16th March.

Northumberland Shipbuilding Co., Ltd., Howdon.

CARGO steamer ; 390ft., by 49ft., by 29ft. ; 7,500 tons deadweight. Built for Messrs. Furness, Withy and Co., Ltd., West Hartlepool. The 'tween decks are lofty, and so arranged that cattle, troops, or emigrants can be carried. The triple expansion engines, by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, have cylinders 25, 41 and 69in., by 48in. stroke, with three boilers. Trial trip, 2nd March.

Palmer's Shipbuilding & Iron Co., Ltd., Jarrow.

CARGO steamer ; 400ft. long ; 8,400 tons deadweight. Built for the Ellerman Lines, Ltd., London and Liverpool. The steamer has complete 'tween decks, with long bridge, poop, and forecastle. The triple expansion engines, constructed by the shipbuilders, give the vessel a speed of between 11 and 12 knots. Trial trip, 15th February.

CARGO steamer, single-deck type ; 370ft. long ; over 7,500 tons deadweight. Built for the Hungarian Levant Steamship Co., Ltd., Budapest. The propelling machinery consists of triple expansion engines with three boilers. Launched, 2nd March.

John Readhead & Sons, Ltd., South Shields.

CARGO steamer ; 384ft., by 51 $\frac{1}{2}$ ft., by 26ft. 8 $\frac{1}{2}$ in. Built for the Navigazione a Vapore "Unione," Dubrovnik. The triple expansion engines, constructed by the shipbuilders, have cylinders 26, 43 and 71in., by 48in. stroke, with three boilers. Trial trip, 6th March.

CARGO steamer, single-deck type ; 7,550 tons deadweight. Built for Messrs. Edward Hain and Son, St. Ives, Cornwall. The triple expansion engines, constructed by the shipbuilders, have cylinders 26, 42 and 69in., by 48in. stroke, with two boilers. Launched, 15th March.

Swan, Hunter, & Wigham Richardson, Ltd.

CARGO steamer ; 390ft. long, by 50 $\frac{1}{2}$ ft. beam ; 7,700 tons deadweight. Built for Messrs. J. & C. Harrison, Ltd., London. Accommodation is provided for a limited number of

passengers. The triple expansion engines and two boilers, working under Howden's forced draught, were constructed by the shipbuilders. Trial trip, 6th January.

"Ceiba." PASSENGER and fruit-carrying steamer; 270ft. long, by 39ft. beam. Built for service between

the United States and Central America. In order that the fruit may be safely carried through the tropics, a great number of ventilators are fitted both to the holds and 'tween decks. Accommodation is arranged amidships for about 30 first-class passengers, two *cabines de luxe* being provided. A special feature of the accommodation is a large shelter on deck, fitted with seats and tables protected from the weather. An

The consumption, speed, gun, and anchor trials passed off in a manner highly satisfactory to the Government officials, and the vessel was delivered six weeks ahead of the contract date, arriving at Portsmouth on the 3rd March.

* **"Gerona."** TWIN-SCREW passenger and cargo steamer. Built to the order of the Cairn Line of Steamships, Ltd., Newcastle, for their Canadian service. The vessel embodies some of the features of the *Tortona*, recently constructed by Messrs. Swan, Hunter, & Wigham Richardson for the same owners, but is larger, has a great deal more passenger accommodation, and has in every way been improved to meet the increasing requirements of the services between England, Canada,



Photo by]

H.M.S. "Hope" on Full-power Trial.

[Frank & Sons, So. Shields.

installation of wireless telegraphy is fitted. The triple expansion engines and boilers were constructed by the shipbuilders. Launched at the Neptune Works, 28th February.

H.M.S. "Hope." OCEAN-GOING torpedo-boat destroyer. The vessel is one of the twenty destroyers of the *Acorn* class ordered under the Naval Programme of 1909-10. The propelling machinery consists of Parsons turbines driving three shafts. The steam-generating installation comprises four water-tube boilers of the Yarrow type, fired by oil fuel, and both engines and boilers were constructed by the Wallsend Slipway & Engineering Co., Ltd. The *Hope* is the first destroyer built by Messrs. Swan, Hunter, & Wigham Richardson.

and Italy. There is a complete shelter deck from stem to stern, with a poop, a long bridge, and a topgallant forecastle. Accommodation is provided amidships for about 140 first-class passengers. The dining saloon extends right across the vessel, and is surmounted by a handsome dome, and on the deck above is situated the music room. The smoking room is at the after end of the deckhouse on the promenade deck, abaft of which is a verandah café. On the shelter and in the upper 'tween decks berths are provided for about 1,500 third-class passengers, with ample dining accommodation. The vessel has large cargo capacity, part of the space being insulated for the

* Since acquired by the Cunard Steamship Co. and re-named the *Ascania*.





OTHER ENGLISH CENTRES.

Cammell, Laird & Co., Limited, Birkenhead.

STEAMER for service on the "Montenegro." Amazon; 159ft., by 32ft., by 10ft. Built for Señor Carlos Montenegro, Manaos, Brazil. The triple expansion engines have cylinders 13½, 23 and 35in., by 24in. stroke, with one boiler constructed to burn wood or inferior fuel. The vessel will have a speed of 11 knots loaded. Launched at Birkenhead, 31st January.

TORPEDO-BOAT destroyer; 293ft. "San Luis." overall, 285ft. B.P., 27½ft. beam, and 980 tons displacement on 8½ft. mean draught on trial. The vessel is the first of four now building at Birkenhead for the Argentine Government. The propelling machinery, which consists of turbine engines and five White-Forster boilers, will develop 19,750 H.P. and give the vessel a speed of 32 knots on trial. Launched at Birkenhead, 2nd February.

PASSENGER and cargo "Highland Loch." steamer; 414ft., by 56ft., by 37ft. 8in. Built to the order of the Nelson Steam Navigation Co., for their River Plate trade. Above the shelter deck there are saloon, promenade, and boat decks, with accommodation for 81 first and 32 second-class passengers. The vessel also carries about 3,500 tons of chilled meat. The triple expansion engines, constructed by the shipbuilders, give a sea speed of 13 knots. Trial trip, 11th March.

TORPEDO-BOAT destroyer. The "Santa Fe." vessel is the second of four destroyers at present building by Messrs. Cammell, Laird & Co. for the Argentine Government. Launched at Birkenhead, 15th March.

Cochrane & Sons, Selby.

SCREW trawler; 130ft. long. "Wallington." Built for the Premier Steam Fishing Co., Ltd., Grimsby. The triple expansion engines were constructed by Messrs. C. D. Holmes and Co., Ltd., Hull. Launched, 18th January.

SCREW trawler; 115ft. long. Built "Beru." for Messrs. Baker & Grant, Grimsby. The triple expansion engines were constructed by Messrs. C. D. Holmes & Co., Ltd., Hull. Launched, 2nd February.

SCREW trawler; 119ft. long. Built "Yesso." for Mr. H. L. Taylor, Grimsby. The triple expansion engines were

constructed by Messrs. Amos & Smith, Ltd., Hull. Launched, 16th February.

SCREW trawler; 126ft. 8in. "Neil Gow." long. Built for the Orient Steam Fishing Co., Ltd., Grimsby. The triple expansion engines were constructed by Messrs. C. D. Holmes & Co., Ltd., Hull. Launched, 3rd March.

SCREW trawler; 130ft. long. "Phrontis." Built for the Mount Steam Fishing Co., Ltd., Fleetwood. The triple expansion engines were constructed by Messrs. Amos & Smith, Ltd., Hull. Launched, 4th March.

SCREW trawler; 126ft. 8in. "Persimon." long. Built for Mr. W. J. Barrett, Grimsby. The triple expansion engines were constructed by Messrs. C. D. Holmes & Co., Ltd., Hull. Launched, 16th March.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

CARGO steamer, single-deck type; "Castro." 250 ft., by 35 ft., by 18 ft. Built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., Hull, for the general Baltic trade. Launched, 15th February.

CARGO steamer, single-deck type. "Hydro." The vessel is a sister ship to the *Castro*, and was built for the same owners. Launched, 3rd March.

ASH hopper steamer; 110ft., by 24ft., by 12ft. The vessel is the first of her type built for the British Admiralty for transporting ashes from battleships in docks or rivers and discharging them at sea. For this purpose a hopper is built forward, capable of carrying 100 tons of ashes. The bottom is arranged in large sections to binge down, which are worked by quick-acting winches on deck geared to a powerful windlass. Accommodation is provided for 12 men. The propelling machinery consists of triple expansion engines and one boiler, giving the vessel a speed of nine knots. Launched, 16th March.

Goole Shipbuilding & Repairing Co., Ltd., Goole.

SCREW trawler; 126ft. 8in. long. "Lucida." Built to the order of Messrs. J. Marr & Son, Ltd., Fleetwood, for trawling off Iceland, in the Bay of Biscay, etc. The propelling machinery was constructed by

Earle's Shipbuilding & Engineering Co., Ltd., Hull. Launched, 2nd February.

SCREW trawler. The vessel is a "Kilda." sister ship to the *Lucida*, and was built for the same owners. Launched, 16th February.

Thames Ironworks, Shipbuilding & Eng. Co., Ltd., Canning Town.

H.M.S. "Thunderer." BATTLESHIP of the *Orion* type. The vessel is one of the four "contingent" armoured ships ordered by the British Government towards the close of the 1909-10 financial year, and is a sister ship to the *Monarch*, launched by Sir W. G. Armstrong, Whitworth & Co. and described elsewhere in the present issue. In the *Thunderer*, however, the steam-generating plant consists of Babcock and Wilcox water-tube boilers, as in the *Orion*, *Conqueror*, *Colossus*, etc. The first keel plate of the *Thunderer* was laid on the 13th April, 1910, and the vessel was launched on the 1st February.

John I. Thornycroft & Co., Ltd., Woolston.

"Marynthea." TWIN-SCREW yacht; 211 $\frac{1}{4}$ ft. B.P., 193 $\frac{3}{4}$ ft. on the water-line, by 30ft., by 18ft. 4in.; 1,000 tons displacement. Built to the order of Messrs. Camper & Nicholson, Gosport, who are the designers. The vessel is in many respects similar to the *Miranda*, Lord Leith of Fyvie's yacht, which was also built by Messrs. Thornycroft and which was at the time the largest yacht constructed on the South Coast. The *Marynthea*, however, is still larger. The vessel has poop, forecastle, shade and bridge decks, and the forward end of the deckhouse is carried out to the ship's side to form a breakwater. The propelling machinery consists of two sets of Thornycroft triple expansion engines with cylinders 15, 23 $\frac{1}{2}$ and 38in., by 24in. stroke, with two boilers, and gives the vessel a speed of 15 knots. The *Marynthea* has been fitted out by Messrs. Camper and Nicholson at their Gosport works. Launched, 23rd January.

H.M.S. "Larne." TORPEDO-BOAT destroyer; 780 tons displacement. The vessel is the first to be delivered of the English-built destroyers of the 1909-10 programme. The propelling machinery consists of Parsons turbines and oil-fuel boilers, giving a speed of 27 knots. After completing the necessary acceptance trial, the *Larne* was commissioned at Portsmouth on the 1st February.

H.M.S. "Minstrel."

TORPEDO-BOAT destroyer. The vessel is the last of the four destroyers of the 1909-10 programme built by Messrs. Thornycroft. Launched complete, with engines and boilers on board, 2nd February.

Vickers, Sons & Maxim, Ltd., Barrow.

H.M.S. "Dartmouth." SECOND-CLASS protected cruiser of the improved *Bristol* type; 430ft. B.P., by 49ft. beam; 5,500 tons displacement on a normal load draught of 16 $\frac{1}{2}$ ft. Her protective deck, of 2-in. nickel steel, extends the full length of the ship, completely covering all machinery, boilers, magazines, and other vital parts. There is a continuous double bottom, subdivided for the storage of oil fuel. The primary battery is composed of eight 6-in. guns, and the vessel carries two 21-in. torpedo tubes. The Parsons turbine propelling machinery, driving four shafts, will give the vessel a speed of at least 25 knots. The *Dartmouth* is the third to take the water of the four similar cruisers ordered by the British Government in October, 1909, the others being the *Falmouth* (Messrs. William Beardmore & Co., Dalmuir), the *Weymouth* (Sir W. G. Armstrong, Whitworth & Co., Newcastle), and the *Yarmouth* (London and Glasgow Shipbuilding Co., Govan). Launched, 14th February.

Floating Dock.

BUILT for the Aberdeen Harbour Authorities. The dock consists of two parallel side walls and a deep double bottom, made up of interchangeable pontoons, six of which are attached to the side walls, with an additional pontoon as a reserve, to take the place of any of the others. The overall length of the side walls is 310ft., each pontoon is 50 feet long by 12 $\frac{1}{2}$ ft. deep, the overall width of dock is 90ft., clear width between rubbing timbers 66 $\frac{1}{2}$ ft., and height of side walls and pontoons 45 $\frac{3}{4}$ ft. The dock can lift a vessel 350ft. long, 5,350 tons displacement, and drawing 23 feet, in two hours, and is so designed that several steam trawlers can be docked simultaneously. The pumping machinery consists of an installation of horizontal centrifugal pumps driven by vertical electric motors. The power for operating the various motors and lighting the dock will be supplied by a cable from the shore. An electric travelling crane, capable of lifting five tons, travels the full length of one of the walls; and mechanical side and bilge shores, keel and bilge blocks, etc., are provided. Launched, 31st March.

J. Samuel White & Co., Ltd., East Cowes.

H.M.S. "Riflemen." OCEAN-GOING torpedo-boat destroyer ; 240ft. long. The vessel is one of the three 27-knot destroyers ordered by the British Admiralty from Messrs. White under the 1909-10 Programme. A speed of over 28 knots was attained on the trial, which took place on the 26th January.

FOREIGN CENTRES.**Antwerp Eng. Co. Ltd., Hoboken, Antwerp.**

"Ihumata." CARGO steamer ; 230ft., by 35½ft., by 16ft. 10½in. Built for the Union Steamship Company of New Zealand, Ltd. The triple expansion engines, by the North Eastern Marine Engineering Co., Ltd., Wallsend, have cylinders 17, 28 and 46in., by 33in. stroke, with one boiler. The vessel is the first British steamer to be built in Antwerp. Trial trip, 8th March.



Photo by]

[J. Peltier, Nantes.

Quadrupole-screw S.S. "Rochambeau," before launching.

H.M.S. "Ruby." OCEAN-GOING torpedo-boat destroyer. The vessel is one of the three 27-knot vessels ordered by the British Admiralty from Messrs. White under the 1909-10 Programme. A speed considerably in excess of the contract speed of 27 knots was attained on the trial. Trial trip, 22nd February.

Atlantic Works, St. Nazaire.

"Rochambeau." QUADRUPLE-SCREW Atlantic passenger steamer ; 538½ft., by 63ft. 8in., by 43ft. 4in. to spar deck ; 17,300 tons displacement. Built to the order of the Cie. Generale Transatlantique, for their service between Havre and New York. Accommodation is provided for 422 cabin and 1,462 third-class passengers, or a total of 1,884. The propelling machinery consists of two sets of triple expansion engines and two low-pressure turbines driving four screws. Contrary to the practice hitherto adopted in combination engines driving triple screws, the reciprocating engines actuate the two centre shafts and the turbines the two wing shafts. When the reciprocating engines are working astern, they exhaust direct into the condensers. Steam is supplied by nine boilers working at 200lb. pressure. The total indicated horse-power of the machinery will be 11,000, giving a speed of 17 knots. The *Rochambeau* is expected to be ready for service next September. Launched, 2nd March.

Blohm & Voss, Hamburg.

"General." TWIN-SCREW mail and passenger steamer ; 448ft., by 24ft., by 32½ft. Built for the Deutsche Ost Afrika Linie, for their African service. Accommodation is provided for 120 first, 84 second, and 88 third-class passengers. The two sets of quadrupole expansion engines, of 4,800 H.P., give the vessel a speed of 13½ to 14 knots on service. Trial trip, 25th February.

Koninklijke Maatschappij "de Schelde," Flushing.

"Wolf." TORPEDO-BOAT destroyer. The vessel is one of the two ordered by the Dutch Government from Messrs. Yarrow & Co., Ltd., Scotstoun, and constructed in Holland. A mean speed of 30·08 knots was easily obtained during the three hours' trial,

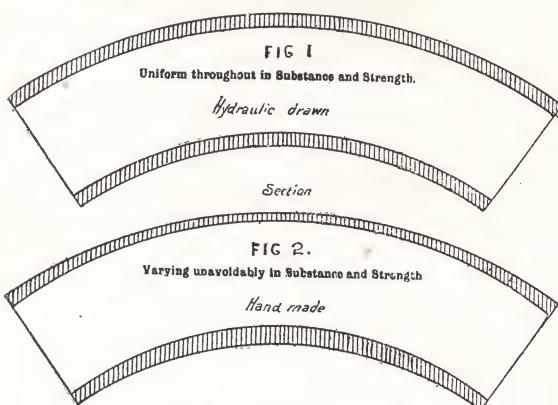
Improvements in Ship Plumber Work.

HIGH-CLASS, painstaking workmanship in ships' plumber work is difficult of attainment under the circumstances in which new vessels are usually equipped and finished. As a rule expedition is a necessity; and the awkward situations in which work has to be done, and its vital character as associated with the systems of water service, ventilation, and sanitation generally throughout the ship, are considerations which do not equally contribute to satisfactory results. In cases of repairing or re-fitting old ships, expedition, reliable workmanship, and good material are more difficult to obtain in association even than in new work. These are truisms which most shipbuilding firms, whether they do their own plumber work or sub-contract for it, have learned from experience and from the vigilance (and fastidiousness it may be) of owners' superintendents. The more plumber work, therefore, that can be executed in the shops with a plentiful supply of light and space, and by the aid of accurate mechanical apparatus, the greater will be the expedition, accuracy, and economy. Lending itself to these conditions particularly is the class of work which embraces the solid-drawn lead pipe bends, traps, siphons, offsets, etc., manufactured by special hydraulic machines from soft, pure pig lead by Messrs. McAlpine & Co., Limited, at their Thistle Works, Govan, Glasgow, and which are now being extensively adopted in

thickness, substance, and strength of the hydraulic-drawn article is apparent in the sectional sketch, Fig. 1; while the variation in thickness and substance—and, therefore, in strength—at this critical point in any section of water piping when produced by hand is shown in Fig. 2. The superior ductility of solid-drawn bends over hand-made work is also proved by a report made after severe tests by Messrs. Kirkcaldy & Son, London, the renowned test experts, which showed that as between hand-made bends and solid-drawn ones an average of 8,500 more deflections were sustained by the latter than by the former before cracks developed. A special expansion bend made by the firm is guaranteed to absorb several inches of expansion, contraction or vibration. Messrs. McAlpine stock the usual right-angle bends, etc., from 1 in. to 8 in. diameter, and from 10 lb. to 168 lb. per yard according to the diameter of the pipe. Any angle can be imparted to both legs of a siphon and any length to both inlet and outlet of scupper traps, etc., while any depth of seal can be given to traps up to 3 ft. 6 in. The illustration of a group of bends (some of them untrimmed) given in Fig. 3, while representing only one delivery to a well-known Clyde shipbuilding firm, is perhaps sufficient to convey an idea of the variety of curves and diameter of piping dealt with.

As to cost, these bends and traps will be found to compare favourably—especially when consideration is given to their efficiency and lasting qualities—with hand-made articles. They admit of considerable economy, both as regards cost and weight to be carried, the latter quality especially being of the greatest consequence in certain classes of shipping. Hand-made bends are weakened and reduced by heating and hammering by as much as 25 to 30 per cent., and have to be fitted heavy enough to overcome such local weakness. The Thistle Works traps and bends are guaranteed of equal strength and thickness throughout and justify the use of lighter material, thus securing the twin economy of diminished weight and cost. Emphasis should also be given to the fact that these traps and bends are not simply lead pipes bent by machinery—let alone hand-made goods, hammered, heated, and twisted—but are solid-drawn under immense hydraulic pressure to patterns or templates, and are absolutely identical where repetition work is involved.

The plant employed in Messrs. McAlpine and



Figs. 1 and 2.—Hydraulic-drawn and Hand-made Lead Bends.

the works of shipbuilders and engineers. The outstanding advantage of the bends produced by this firm is that they are uniform in thickness at the very crown of the bend. The uniform

Company's works is of a very special kind ; and although the details of its operation are more or less of a secret nature, we are enabled to give, from a visit paid by our representative, some general idea of the working. The leading operator sits behind the hydraulic machine, surrounded by numerous valves and levers, which control the hydraulic rams and cylinders forming the main features of the machine. Under his direction and control a lead pipe slowly rises from an aperture in the centre, which, in response

diameter, and thickness—and would probably even then leave a coating of caked sand inside. How the valves are arranged and linked up to produce the foregoing result, and at the same time control a hydraulic pressure of several hundred tons, is, of course, guarded as a secret by the firm. Only the purest pig lead can be used, and foreign matter of any kind must be rigidly excluded ; otherwise valuable machinery would be rent into scrap.

Messrs. McAlpine & Company, while not laying



Fig. 3.—Hydraulic-drawn Lead Bends (some untrimmed) for Steamers.

to skilled adjustments often linked up in one particular movement, gracefully bends to any angle and in any direction required. When the necessary length is obtained, another operator with a circular saw cuts off the product. In a few moments a lead bend is produced—with beautiful finish of surface both outside and in—exactly to the size and shape required and without an ounce of waste. The nearest approach to this product in the matter of finish and accuracy that a plumber might attempt would take hours, if not days, to complete—according to the size,

themselves out to supply bends and lengths of piping with flanges complete, have recently developed a new method of fitting their bends with pure lead-to-lead flanges, without solder of any sort. Each diameter of pipe requires a separate mould, and the key to the process is a mandrel which exactly fits the interior diameter. A special ribbon flux is recommended, and the finished article is a neat job at a lower cost than has hitherto been possible by employing a wiped solder joint, quite apart from the longer time involved in making it.



MR. H. C. Broadhurst has been appointed secretary of Palmers Shipbuilding & Iron Co., of Jarrow and Hebburn, in place of Mr. Victor

Parker, resigned. Mr Broadhurst has been secretary of Messrs. John Stewart & Sons, Ltd., of London.

